Two Sections—Section One

527

Railway Age

AND RAILWAY REVIEW

FIRST HALF OF 1928—No. 25 JUNE 23, 1928 SEVENTY-THIRD YEAR

Progress
SAFETY ENGINEERS are constantly striving to improve the generation and regulation of car lighting energy—to design fixtures and fans that are scientifically correct and up-to-date in artistic tendencies.
The new Drawn Steel Magnet Frame has reduced the weight of axle lighting generators and improved their construction through greater uniformity of metal
Now a new and complete line of Drawn Steel Control Panels has been perfected to simplify the installation and improve the operation of car lighting systems.
The Safety Car Heating and Lighting Co.
NEW YORK CHICAGO ST. LOUIS BOSTON
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SAFETY
CAR LIGHTING EQUIPMENT

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PROMPT SERVICE

PROMPT shipment of quality Creosoted Pine Poles is an outstanding feature of ***International*** Service.

A large supply of poles ready for "Ship today" Service is carried in stock. Specially framed poles in any quantity, size or type of framing, can be obtained on short notice.

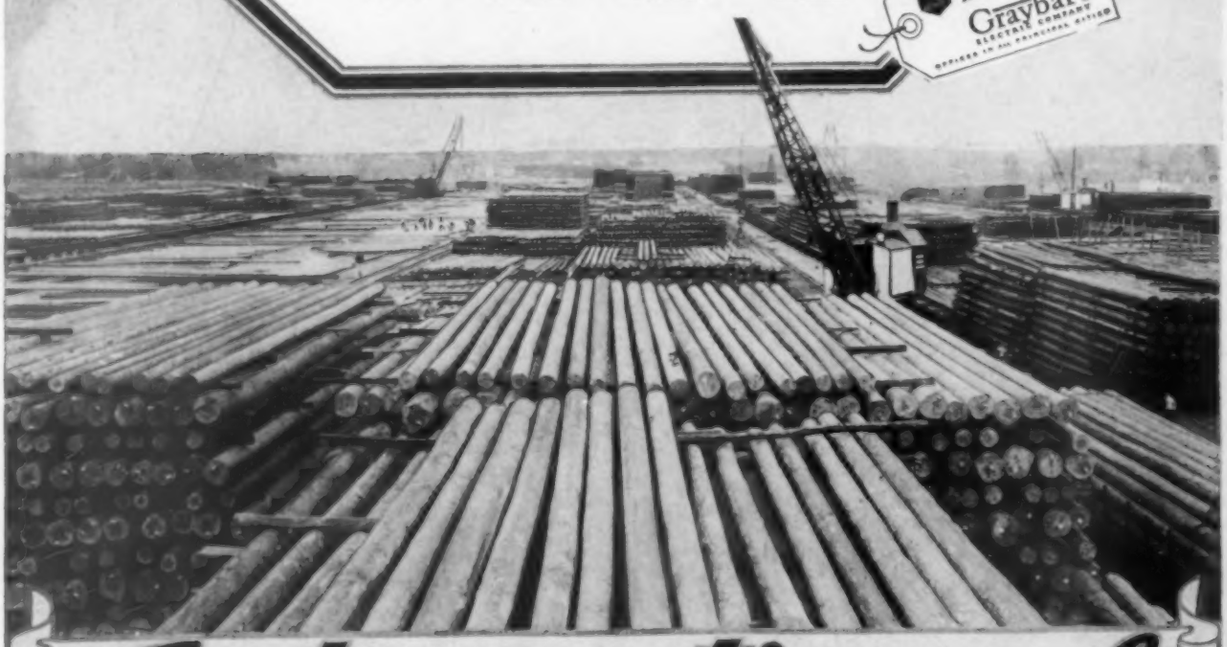
To facilitate the prompt shipment of such poles, ***International*** maintains a corps of expert framers to frame poles before treatment in exact accordance with any specification.

The Texarkana plant has two of the largest treating cylinders in the wood preserving industry. These cylinders together with extensive power equipment enable ***International*** to treat and handle efficiently and economically poles in large quantity and render a service that is unexcelled in the Creosoted Pine Pole Industry.

Illustration shows a section of the seasoning and framing yard at Texarkana which is tile drained and kept free from vegetation.

International Creosoting & Construction Co.
General Offices—Galveston, Texas
Plants: Texarkana Beaumont Galveston

Distributed by GraybaR ELECTRIC COMPANY



International Creosoted Yellow Pine Poles

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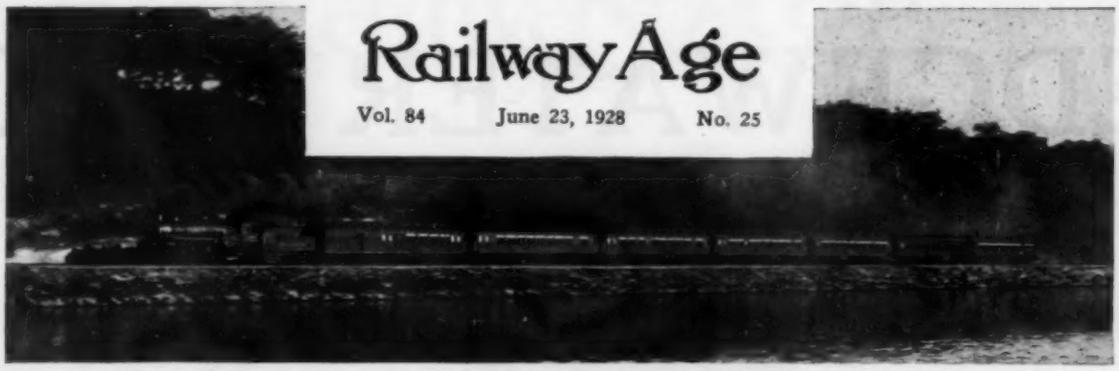
Railway Age

Vol. 84 June 23, 1928 No. 25



"The Twentieth Century Limited" along the Hudson River

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LUCIUS B. SHERMAN, *Vice-Pres.*
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CHICAGO: 105 West Adams St.
WASHINGTON: 17th and H Sts., N. W.
CLEVELAND: 6007 Euclid Ave.
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Equipment Protection not Heretofore Possible

Made by

EDGEWATER STEEL COMPANY

Pittsburgh, Pa.

Railway Age

Vol. 84, No. 25 June 23, 1928

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Reducing Car Detention

IN almost every instance, the larger part of freight car detention occurs at the destination rather than at the point of origin. Realizing this, many railways are instituting measures designed to eliminate much of this destination detention. A number of methods have been used successfully in doing this. Agents have been instructed to give notice of the arrival of freight as soon as it comes in. Consignees are encouraged to enlarge their facilities to permit of faster unloading, while dealers in commodities, such as grain and produce, that are reconsigned frequently, are forming central clearing houses where arrival notices may be sent and disposition given without the unavoidable delays occasioned by handling through individual shippers. The time and number of daily switchings are being standardized and warehouse doors and car spots are being designated by number, so as to avoid delay and confusion in switching. These and similar methods will do much in reducing car detention at destination.

The Average Freight Train

THE average freight train of today differs in almost every important respect from the average freight train of a few years ago, although to the casual observer who waits for it to pass at a highway crossing it may look just the same. It has been changed both by the efforts of railway managements to improve their service, and by their efforts to effect economies. It moves at a higher speed than ever before. Eight years ago it moved 10 miles an hour, while it now moves 12.8 miles an hour, an increase of about 27 per cent. During the same period the number of cars in the average train has increased from about 36 to about 48, or 35 per cent. Unfortunately, from the standpoint of both railway earnings and expenses, especially the latter, the number of empty cars in it has increased more than the number of loaded cars. This apparently has been due to the success of the cooperative efforts of the railways and the shippers to so distribute cars that they will always be where they are needed. In order to accomplish this purpose it seems necessary to move relatively more cars empty than was formerly done in the days of "car shortages". At any rate, eight years ago the average freight train contained only 10 empty cars and 26 loaded cars, while now it contains about 17 empty cars and 31 loaded cars. There has also been a decline in the average number of tons of freight in each loaded car. However, despite the decline in the load per car and an increase in the number of empty cars per train, the average freight train, because of its increased length and speed, renders much more freight service than formerly. Eight years ago the service rendered by the average train hourly was equivalent to carrying 7,440 tons one mile, while now it is equivalent to carrying 9,915 tons one mile, an increase of 33 per cent. Traveling at an average speed of about 13 miles an hour, all the freight trains in the United States move an average distance daily of about 1,675,000 miles. This is equivalent to 70 trains going around the earth daily, or to 560 moving from New York to San Francisco daily. Allowing for the changes in prices and wages that have occurred since before the war, the average freight train is a much more speedy, reliable, efficient and economical means of handling the vast commerce of the United States than it ever was before.

Vitalize the Bulletins

DESPITE the arguments as to the superiority of the spoken word over bulletins as a means of imparting instructions to any considerable body of employees, the fact remains that the bulletin must often be used, and, if properly worded, not only can be made to serve its purpose, but to serve it well. Aside from those bulletins which are issued to cover some new method in operation or maintenance, this form of address ordinarily is used to call the attention of the employee to the rules or standards where a tendency has been shown to depart from them. This very fact operates to make them a reiteration of much that has gone before, and unless they are written in such a way as to arrest the attention of the recipient at once, his only comment is "old stuff", after which he promptly forgets them. One may eat potatoes once or twice a day for many days in succession, but the cook is wise enough to prepare them in different ways to make them acceptable.

A Cup for Mr. Aishton

UNLESS our journalistic judgment errs, all classes of our readers will take especial pleasure in reading the article, published elsewhere in this issue, regarding the recent presentation to R. H. Aishton of a gold cup by the members of the Executive Committee of the Association of Railway Executives and the addresses made on that occasion. Mr. Aishton has had a career of fifty years in railway service, which he should be able to review with great satisfaction. After having risen steadily from an employee to the presidency of the Chicago & North Western, he has, since the railways were returned to private operation in 1920, rendered, as president of the American Railway Association, a service which was vitally needed and which, because of his training, experience, ability and personality, he was extraordinarily well-equipped to render. It would be difficult to overestimate the value of the contribution he has made to the improvement in railroad service, in the relations between the railroads and in the attitude of the public toward them, within the last eight years. The graceful and eloquent tribute paid to him by Daniel Willard in presenting the executives'

cup to him, will be endorsed by every business man and railway officer in the country who realizes the unselfish thought and energy that the president of the American Railway Association has devoted to the cause of better transportation and the results he has been so largely instrumental in securing.

The Superintendents' Association—Its Benefits

APPROXIMATELY 250 division superintendents, general superintendents and other operating officers of railways of the United States, Canada and Mexico met in the convention of the American Association of Railroad Superintendents at Memphis, Tenn., last week. Their deliberations, as reviewed in part on following pages in this issue, constitute a valuable addition to the literature on current transportation problems. In contrast with the engineering and particularly the mechanical department, where numerous associations consider the problems of highly specialized subdivisions of these departments, there is only one organization of transportation officers and the wide variety of problems involved in the movement of traffic and in the maintenance of proper relations with those who ship and those who live along the lines come within the scope of its activities.

The value of association work is almost universally recognized among railway managements today. They know that no small part of the progress that has been made by our transportation system is due to the co-operative study that has been given to problems by associations and to the interchange of experience through discussion on the convention floor.

The transportation department is the most important department in railway service. It is the producing or manufacturing branch. All other activities are or should be subordinate to it. The necessity for efficiency here is, therefore, paramount. For this reason the Superintendents' association should receive the whole-hearted co-operation of railway managements.

Those operating officers who attended the Memphis convention benefited greatly from the meeting. Their numbers, however, should have been five times as great. It is true that the conflict with the National Republican convention at Kansas City kept some men at home handling special train movements. It is true also that other local conditions kept still more men on their territories. Yet, the lack of attendance is more far-reaching than this, for it exists from year to year. It goes back to a lack of appreciation of the value of co-operative effort among the rank and file of division operating officers and to a lack of recognition of the educational value to themselves of such a meeting. A general superintendent of one of the best operated roads in the country left the convention with a note book filled with suggestions gained during the meeting. The same help was there for others.

The Superintendents' association is a worth-while organization. It is doing a constructive work for the railways, which more of them should benefit from. If it is not doing all that might be desired, the way to bring about the proper results is to cast one's lot with the organization and lend his energies to the achievement of the desired goal. Those railways will benefit most directly in the work of this association whose men take the most active interest in it, for it is a recognized truth that he gets most out of any organization who puts the most into it.

Pensions—What Next?

AN attempt has been made in a series of editorials on pensions in the *Railway Age* to point out some of the difficulties that have perplexed industrial and railroad executives in their attempts to install and maintain effective and adequate pension plans. That the problem is recognized as one of great importance in the industrial world, is indicated by the time and effort which have been given to its study by several organizations and not a few well qualified individuals.

It must be admitted also that while these difficulties have been fully recognized for some time by those who are regarded as experts on the pension question, industrial and railroad owners and executives in general cannot be said to have shown any great degree of concern, largely because so few organizations have had a sufficiently long experience with pensions to realize clearly just what is involved, or what may be the ultimate costs and responsibilities.

The *Railway Age* has gone into this question as extensively as it has because a constructive solution of the problem, in the best interests of all concerned, depends upon a wide knowledge of the facts and of the exact difficulties which are being faced; and particularly, in the railroad and public utility field, of a common understanding of the problem, in order that an intelligent joint effort may be made to find the plan best suited to that particular field.

The railroads have reason to be proud of one thing, and that is that they were among the very first in this country to inaugurate pension plans. The National Industrial Conference Board, in its report on industrial pensions in the United States, published in 1925, attempted to include in its study "every pension plan operative in private, industrial, mercantile and financial establishments. The plans of railroads, public utilities and a few semi-public institutions are included, but governmental pensions for employees and others, as well as provisions of trade unions and other fraternal or benevolent organizations are not considered." Almost 250 plans were analyzed and listed. It appears that of the nineteen pension plans established in this country prior to 1904, twelve, or almost two-thirds, were by steam railroads.

The list of those pension plans which were inaugurated prior to 1903 and the dates of their inauguration, emphasize still more strikingly the early adoption by the steam railroads of this practice, the need for which is now coming to be more and more generally recognized. The Baltimore & Ohio led off in 1884, followed by the Sherwin-Williams Company in 1887, the Delaware & Hudson in 1895, the Pennsylvania Railroad and the Plymouth Cordage Company in 1900, the Chicago & North Western and the Illinois Central in 1901, and the Delaware, Lackawanna & Western, the Philadelphia & Reading, and the United Electric Railways of Providence in 1902. It is also of interest, as indicating the rapid recent growth of pension plans, to note that according to the compilation of the National Industrial Conference Board in 1925, four-fifths of the total number of plans listed were inaugurated between 1910 and that date.

We have attempted in the editorials thus far to outline the problem, to point out some of the more serious

difficulties, and to direct attention to the broader recommendations or findings of some of the more important reports or treatises which have been published up to this time. What about the solution of the problem, for there is no question but what it is generally recognized as a problem which has not yet been fully solved? What is the best system or plan for use by a railroad or public utility? It is significant that most pension authorities hesitate to recommend any one plan for general use, either in the industrial field or for the public utilities. For one thing, however, several critical studies have been made on a scientific basis in recent years. As a result of these and of past experiences, certain tendencies have developed, or are well under way, that seem to be most promising. An attempt will be made, in the next few numbers of the *Railway Age*, to point out some of these tendencies and also to focus thinking upon how the railroads can more nearly approach the ideals which have been expressed in the findings or suggestions in such reports as those of the Merchants' Association of New York, the National Industrial Conference Board, the Carnegie Foundation for the Advancement of Teaching, etc.

Competition and the Railways

ONE of the most misleading statements often made about railways is that they are by nature monopolistic. Our policy of railway regulation is based largely upon the theory that they are so. Whatever may be true of those of other countries, the railways of the United States always have been subject to intense competition. Many of the most difficult problems of their managements and the government authorities that regulate them at present are due to competition.

An executive officer of one of the largest railway systems in the country recently emphasized the number of applications for reduced rates due to "the intense competition between territories and communities for business, both as regards the marketing of agricultural products and manufactured articles and the extension of trade territory. A large proportion of applications for reductions," he pointed out, "originate in an effort on the part of some city, port or territory to gain an advantage over its neighbor or even over some territory producing similar products or handling similar business. In such cases the railroads are merely a football kicked around among these competing interests." The competition by which the railways are now affected takes more forms and is more pervasive than ever before, and the competition due to the causes mentioned by the railway officer quoted is an influence which is seldom emphasized in discussions of railway problems, but is of the first importance.

It used to be said that each railway had a monopoly at all points on its line that were not served by any other railway. This was never entirely true. It is hardly true as to any point now, because of the increasingly general and effective competition of motor vehicles. For many years the railways assumed that there was practically no competition for passenger business excepting at points served by more than one railway. The most effective competition they have ever experienced has been that which they have met from motor vehicles within recent years for the very local passenger business which formerly was called "non-competitive." Likewise, much formerly non-competitive local freight business has been made competitive by the motor truck. As the mileage of hard surface highways and the number of motor vehicles increase the number of points at which any railway can be said to have a monopoly will further diminish.

Territorial and Market Competition

There always has been a tendency to assume that practically all the competition affecting railways was between railways paralleling each other, or between them and other means of transportation operating parallel to them, and past efforts under the anti-trust act to prevent railroad consolidations were directed almost exclusively against the combination of "parallel and competing lines." There has been and still is much of this competition between means of transportation paralleling each other for less or greater distances, but it is doubtful if, excepting temporarily, the competition of lines paralleling each other, and therefore serving much the same producing areas and markets, ever has exerted as potent an influence upon railway service and rates as the competition between means of transportation serving different but competing producing territories or markets. Furthermore it is questionable if there ever was a time when there was more of this kind of competition, or when it had more effect upon railway earnings and service, than now. The competitive struggles of different producing territories and markets with one another, and their tireless efforts to get downward readjustments of railway rates, are the causes of much of the most important rate litigation before the Interstate Commerce Commission and of most of those downward "readjustments" which are made by railway traffic officers.

The recent "rate war" between the railways serving the Ohio and Pennsylvania mines and those serving the southern mines, to which the decision of the commission in the Lake Cargo coal rate case gave rise, is due primarily to the struggle between the coal mines in these producing areas for business in the northwest. When the Minneapolis & St. Louis some time ago proposed a substantial reduction in grain rates its purpose was to help Minneapolis, as a grain market and milling center, to compete more effectively with other markets and milling centers; and the widespread opposition it encountered from shippers was due to the fact that this was recognized as being its purpose. There is much said regarding the competition between the railways and the steamships operating through the Panama Canal. The competition in this case is primarily between the business interests of the east and the middle west for the markets of the Pacific coast. Because of the opposition of western intermountain business interests the commission will not let the railways make lower rates to the Pacific coast than to the intermediate territories. In consequence, the Panama Canal not only deprives the western railways of traffic, but also gives the manufacturers and merchants of eastern territory a competitive advantage over those of the middle west.

Recently the Illinois Central has announced a reduced rate from Chicago via New Orleans through the Panama Canal to the Pacific coast in connection with a steamship line. Its action is heartily endorsed by the business interests of Chicago and as heartily condemned by eastern business interests that compete with Chicago business interests in Pacific coast markets. It is also regarded with apprehension by the western trans-continental lines as tending to divert more traffic from them. The Interstate Commerce Commission some months ago ordered a reduction in the rates on deciduous fruits from California to help the grape industry of that state. Immediately there were demands for corresponding reductions by competing producers in other

territories. The competition between producing areas and markets is international. The current demands for reductions in the rates on grain are made largely on the ground that they are needed to enable the American farmer to meet the competition of the grain producers of Canada and other countries in the markets of Europe.

Competition and Regulation

The railroads are classed with other public utilities for purposes of regulation. Like other public utilities, they have their profits limited and their rates fixed by government commissions. But very few public utilities are subject, excepting temporarily, to such competition as the railways are, and most of them are subject to practically no competition at all. The difference is of the greatest importance. Most public utilities would possess and could abuse the power of monopoly if not regulated. Under present conditions no railway would possess, and therefore none could abuse, the power of monopoly if there were no government regulation. Railways serving the same territory might, and probably would, make agreements regarding rates and service, but they would have to fix rates and render service in competition with railways and other means of transportation serving other producing territories and markets. It would never be possible to eliminate this kind of competition, because there would always be competition between different producing areas and markets, and all experience has indicated that the railways would participate in such competition in efforts to maintain and increase their traffic.

We have presented, then, the spectacle of a great industry which is subject to varied forms of intense and pervasive competition tending constantly to force down its rates and to cause it to render more expensive service, and which, at the same time, is regulated largely upon the theory that it is monopolistic, and in consequence is prohibited from making advances in its rates without prolonged litigation and the consent of government regulating authorities.

No wonder the general tendency of railway rates almost always is downward. In industries not subject to government regulation the law of supply and demand in the long run determines prices. If competition forces the price of a commodity so low that its production becomes unprofitable, the output of it is reduced until there is established a new relationship between supply and demand that puts its price up. We have seen the time, and may see it again, when the supply of railroad transportation was much less than the demand for it but railway rates did not advance because government regulation prevented it. Competition co-operates with regulation not only in forcing reductions, but also in hindering advances in railway rates, because of its influence in tending to prevent competing railways from agreeing upon the advances for which they should ask.

Traffic or Earnings?

It seems to the *Railway Age* that this tendency of competition and government regulation to combine to force down railway rates and keep them down is a menace to the future of the railroad industry which has received too little attention from economists, regulating bodies and railway officers, and which always must be such a menace until it is given more intelligent and constructive attention. It should be given attention primarily by railway executives, because they have the primary responsibility for endeavoring to secure for the railroad industry a prosperity in which all the individual railways can participate.

One of the principal reasons why there has been for years a general tendency for the net operating income of the railroad industry to decline is that the official organizations of the individual lines are constantly seeking for *traffic rather than earnings.* It is constantly assumed, especially by traffic officers, that an increase in the traffic of an individual railway will result in an increase in its gross and net earnings, and yet that this assumption is unwarranted is demonstrated by the fact that during the last twenty years of effective government regulation increases in the traffic of the railways as a whole and of individual lines usually have not resulted, excepting temporarily, in increases in the percentage of return earned by the railroad industry and by most individual lines. Why? Largely because, in their competitive struggles for tonnage, the railways have co-operated with government regulation in reducing or preventing advances in rates, and in consequence have not derived enough earnings from increased business to maintain, much less increase, the percentage of return earned by them on their investment. The railway industry handled more freight business in 1927 than in any previous year excepting 1926. The average return of 4.3 per cent earned on the investment in it was less than in any year since 1922, and less than in twenty of the preceding twenty-four years of private operation. One of the measures of the success of railway management is the service rendered to the public. Measured by that standard railway management is now efficient. Another of the measures of the efficiency with which an industry is managed is the percentage of return earned upon the investment in it. Measured by that standard the managements of the railway industry have nothing to be proud of.

Two Classes of Great Problems

Two classes of great problems demand attention by railway managements—those presented by competition, and those presented by regulation. The former are perhaps as important as the latter. Why is it that the returns earned by the railroad industry are lower than those earned by the electric light and power, the telephone, and other regulated industries, and are showing a tendency to decline, while those of other industries subject to government regulation are increasing? Is not the answer probably to be found in large measure in the competition to which the railway industry is subject—competition with other means of transportation, and competition between the railroads themselves? A railroad or group of railroads may complain when some other railroad or group of railroads adds to or speeds up its service or reduces rates in an effort to get more competitive traffic, but what railroad or group of roads is so pure in this respect that it can cast the first stone? Usually the ultimate result seems to be that each railroad has about the same proportion of the total traffic as formerly and gets smaller earnings for handling it.

Apparently the only kind of rivalry between railroads that always tends to increase the net operating income of each and all of them is rivalry in increasing the efficiency and economy of operation. If railway managements devoted one-half as much effort to getting better regulation and restricting destructive competition as they do to cutting each other's throats to make a Roman holiday for shippers and communities that seem to care nothing about railway earnings, the present and prospective net return of the industry would be more satisfactory.

Burlington Freight Engine Shows Marked Economies

Most powerful two-cylinder locomotive saves about 16 per cent in fuel, 22 per cent in water and 25 per cent in road time

New C. B. & Q. Locomotive in Heavy Freight Service

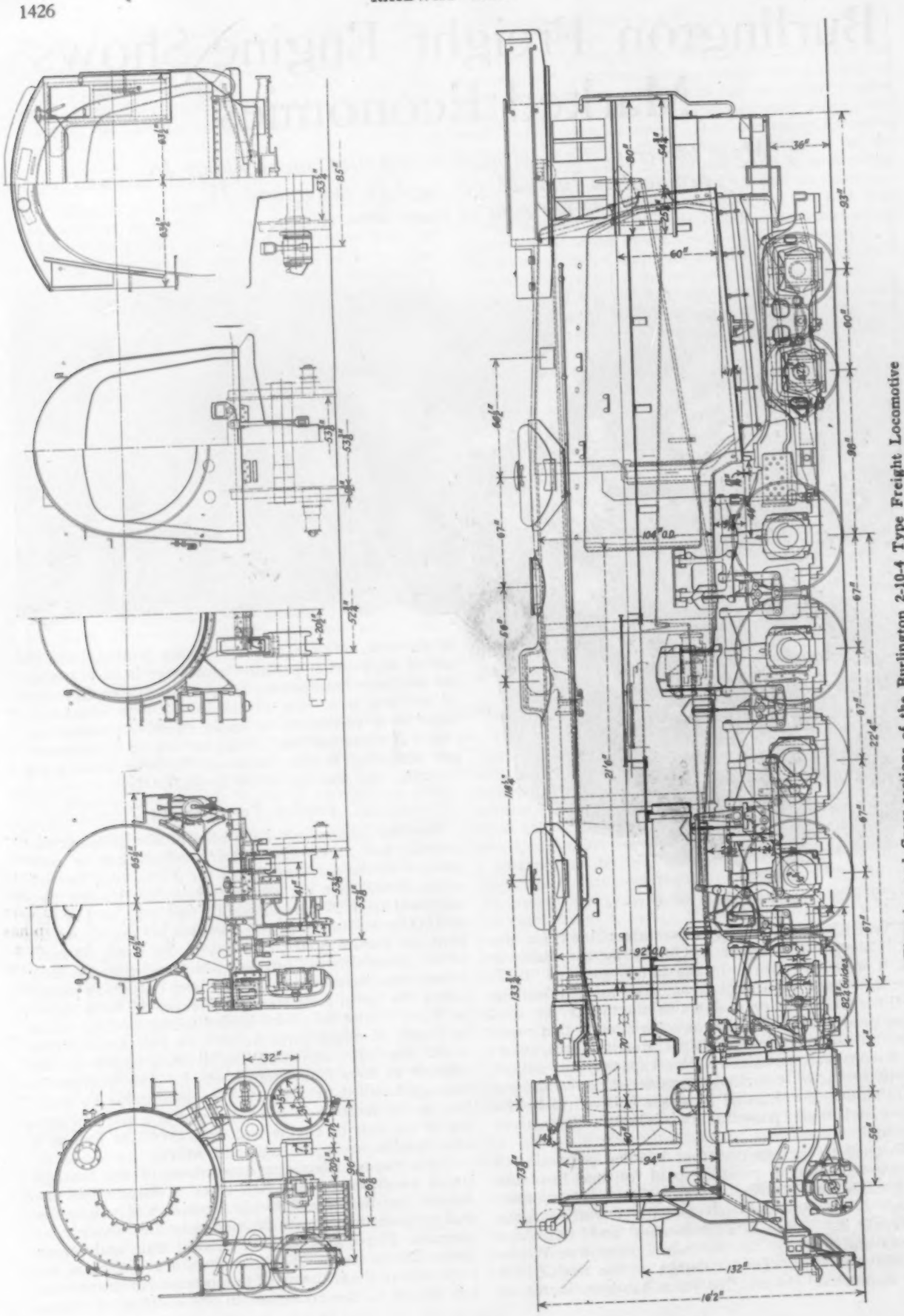
TWELVE 2-10-4 type locomotives, built for the Chicago, Burlington & Quincy by the Baldwin Locomotive works in the latter part of 1927, have now been in service about five months hauling 8,000-ton and heavier coal trains up the .3 per cent ruling grades on the Beardstown division of that road. From the point of view of weight, tractive force, cylinder horsepower, sustained boiler capacity and almost any other factor commonly considered in comparing steam motive-power units, these are believed to be the largest and most powerful two-cylinder locomotives ever built.

Designed to increase the tons handled per train, to effect a reduction in overtime paid for, and to obtain the greatest possible fuel economy, these locomotives replace 2-10-2 type locomotives with a tractive force of 81,600 lb., Type A superheaters and feedwater heaters and built by the Baldwin Locomotive Works in 1914 and 1915. In the design of the new 2-10-4 type locomotive, the tractive force has been increased 10 per cent, or to 90,000 lb. Owing principally to the use of high steam pressure and large boiler capacity, the available horsepower, however, has been increased 30 per cent over that of the 2-10-2 type locomotive, based on a co-efficient of mean effective pressure obtained from actual tests of limited cut-off locomotives; but according to the American Railway Association formula, the tractive effort is 93,700 lb.

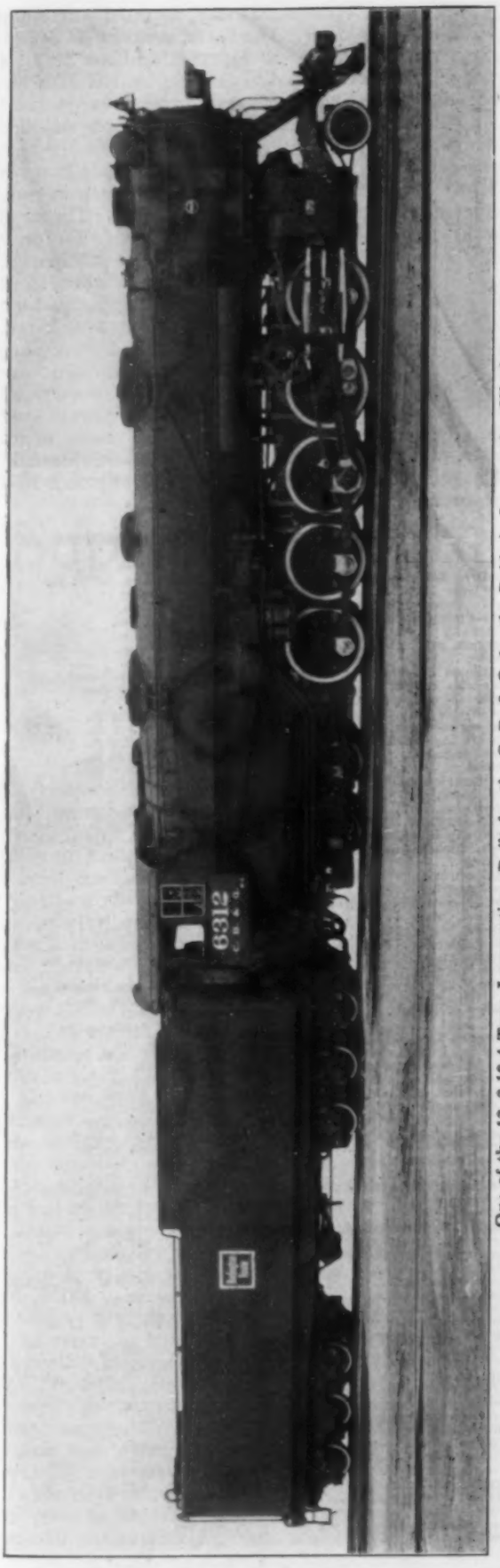
Service Test Results

The new locomotives have been in service about five months, and a record of their performance as compared with the performance of the 2-10-2 type locomotives, shows that the average train, northbound, has increased from 97 cars of 6,800 gross tons, to 113 cars of 8,000 gross tons, also, the overtime per round trip has been cut from 3 hours, 20 min., to one hour, 30 min., with a possibility of further reductions after the new locomotives have been in service long enough to permit lifting the speed restriction of 25 miles an hour placed on them. Since the trains hauled southbound are made up mostly of empty cars, the train load in this direction is not materially increased, but depends largely on the number of cars hauled northbound. The increase in tonnage handled by the new type locomotive, in addition to the decrease in overtime, makes a material saving in the cost of engine and train crews as well as a considerable saving in coal and water.

On a ton-mile basis, a comparison of the tonnage trains handled with the two types of locomotives indicates that the new 2-10-4 locomotive will reduce the coal consumption about 16 per cent, the water consumption 22 per cent and the time of train and engine crews 25 per cent. These savings are not alone attributable to the economy of the locomotives themselves, but partly to the reduction in the number of trains



Elevation and Cross-sections of the Burlington 2-10-4 Type Freight Locomotive



One of the 12, 2-10-4 Type Locomotives Built for the C. B. & Q. by the Baldwin Locomotive Works

handled and to the reduction in engine-and-train-crew overtime. The reduction in overtime is made possible by the high horsepower capacity of the locomotives, maintaining speed on the grades; also because the large coal and water capacity of the tender eliminates two and sometimes three of the water stops necessary with the older power. The elimination of coal and water stops is not only reflected in the saving of time, but has a direct bearing on the saving of coal and water used on a ton-mile basis.

Performance Record of Tonnage Trains Between Beardstown, Ill., and Centralia

Type of locomotive	2-10-2	2-10-4
Northbound, Centralia to Beardstown:		
Tonnage rating	6,800	8,000
Average number of cars in train	97	113
Tons of coal used per trip	26.3	24.9
Gallons of water used per trip	39,650	33,750
Average time on road, hrs.-min.	13–29	11–37
Average time in motion, hrs.-min.	8–50	8–58
Southbound, Beardstown to Centralia:		
Tonnage rating	2,000	2,500
Average number of cars in train	100	125
Tons of coal used per trip	20.2	21.4
Gallons of water used per trip	29,100	30,200
Average time on road, hrs.-min.	10–17	8–36
Average time in motion, hrs.-min.	6–35	6–20
Per round trip:		
Hundred ton-miles	11,734	14,000
Tons of coal used	46.5	46.3
Gallons of water used	68,750	63,950
Time, hours of engine and train crews	26–20	23–32
Per cent saving on ton-mile basis:		
Saving of coal		16
Saving of water		22
Saving in time of crews		25

General Features of Design

The total weight of the new 2-10-4 locomotive, is 512,110 lb., of which 353,820 lb. is carried on the drivers. The driving wheels are 64 in. in diameter; the cylinders are 31 in. in diameter by 32 in. stroke, and the boiler carries 250 lb. steam pressure. With the maximum tractive force of 90,000 lb. a factor of adhesion of 3.93 is obtained.

In the interest of fuel economy the locomotive has been built with 61.4 per cent limited cut-off, Type E superheater, and feedwater heater. Six locomotives are equipped with Elesco and six with Worthington heaters. Superheated steam is used for operating the two 8½-in. cross-compound air compressors, the feedwater pump, stoker engine, headlight generator turbine, and blower.

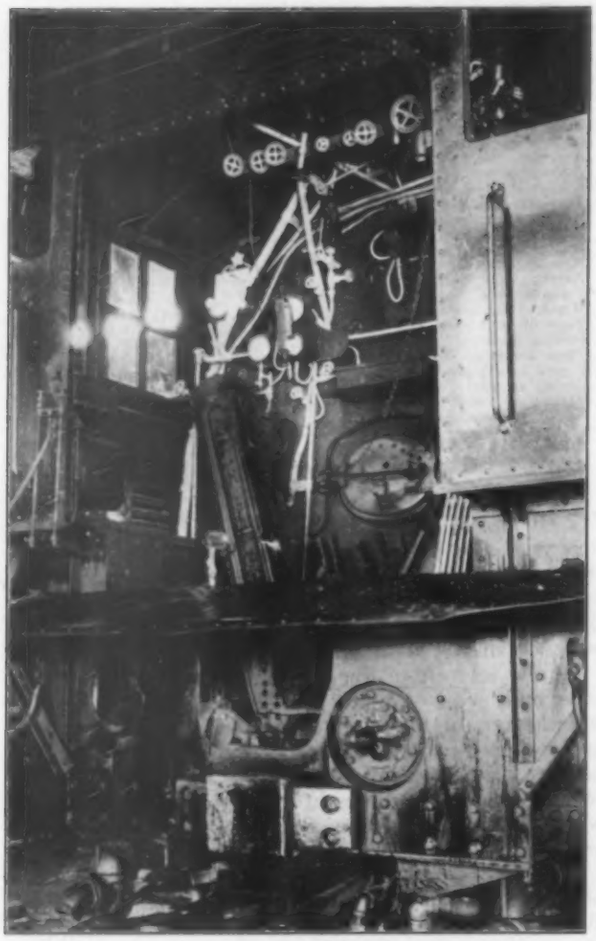
While not provided with boosters, the trailing trucks are arranged for their application later if desired. The Baker valve gear is set to give a normal maximum cut-off of 61.4 per cent, the design permitting this to be increased to 65 per cent if desired at some future time. However, for starting and at extremely low speeds, a maximum cut-off of about 80 per cent is made available by the small auxiliary steam ports in the valve bushings.

Graduated application of power to the train is obtained by means of an American multiple throttle, and it is expected that this feature will be a substantial aid in the reduction of the break-in twos, which sometimes accompany the operation of mile-long trains. Other features in the equipment of the locomotives are Hulson grates, Barco power reverse gear, tandem main rods, Crisco main driving boxes fitted with supplemental thrust blocks and Strombos quadruplex air whistle. In fact, without either the tandem main-rod drive or the main-box thrust blocks it would be impossible to take care of the piston thrusts developed in this design. With 31-in. cylinders and 250 lb. steam pressure, maximum piston thrusts of 189,000 lb. have to be accounted for and the tandem main rod drive distributes the

average load between two pairs of crank pins, driving wheels and boxes instead of concentrating it on a single pair. In spite of the great weight and piston thrusts, bearing pressures and fiber stresses have been kept within conventional limits.

Alloy Steel Rods and Main Axles

In order to keep the weights of reciprocating and revolving parts within reasonable limits, the main rods, side rods and driving axles of the entire lot of 12 locomotives



Cab Interior

are made of quenched and tempered chrome-vanadium steel. On six of the locomotives, the piston rods, crank pins, knuckle pins and crosshead pins also are made of quenched and tempered chrome-vanadium steel. On the other six locomotives, however, these parts are made of annealed carbon steel. The use of heat-treated alloy steel in the parts mentioned permits employing fiber stresses 20 per cent in excess of those permissible with carbon steel. The main rods are of the solid back-end type with floating bushings. Side rod bushings on the No. 3, 4 and 5 crank pins also are of the floating type, principally for ease of renewal, as these rods can not readily be disconnected.

Both the engine and trailer trucks are of Commonwealth design, the latter being of the four-wheel Delta type. The engine truck is equipped with 33-in. wheels and axles having 7-in. by 14-in. journals, while the trailing trucks have 42½-in. wheels and axles with 9-in. by 14-in. journals.

The boiler is of the radial stay, inverted wagon-top type, 92 in. in diameter. The barrel contains 87 2¼-in. fire tubes and 222 3½-in. superheater flues 21 ft. 6 in. long. The firebox is 150 in. long by 102 in. wide, inside the sheets, which gives a grate area of 106.5 sq. ft. Bituminous coal is used for fuel, being supplied to the firebox by a Duplex stoker. The total evaporating surface is 5,904 sq. ft., which is made up of 5,455 sq. ft. in tubes and flues, and 449 sq. ft. in combustion chamber, firebox, and arch tubes. The total superheating surface is 2,487 sq. ft., making the combined superheating and evaporating surface 8,391 sq. ft.

The tender was designed to make two water stops on the 135-mile division, at least one and possibly both of these stops being made where coal chutes are located. The tank is of the rectangular type, carried on a Commonwealth steel underframe, and Commonwealth six-wheel trucks. The tender has a capacity to carry 24 tons of coal and 21,500 gal. of water. Wheels used under the tender are of rolled steel, 36 inches in diameter, and axles have 6½-in. by 12-in. journals.

The general dimensions of the new Burlington 2-10-4 type locomotive are shown in the table.

Table of Dimensions, Weights, and Proportions

Service	Heavy freight
Cylinders, diameter and stroke	31 in. by 32 in.
Valve Gear	Baker
Valves: Piston type, diameter	15 in.
Maximum travel	8½ in.
Steam lap	2⅛ in.
Exhaust lap	1/16 in.
Lead	¼ in.
Maximum cut-off, main ports	61.4 per cent
Maximum cut-off, auxiliary ports	80 per cent
Weights in working order:	
On drivers	353,820 lb.
On engine truck	47,920 lb.
On trailing truck	110,370 lb.
Total engine	512,110 lb.
Tender	385,800 lb.
Total engine and tender	897,910 lb.
Wheel bases:	
Driving	22 ft. 4 in.
Total engine	45 ft. 6 in.
Total engine and tender	95 ft. 11¾ in.
Wheels, diameter outside tires:	
Driving	64 in.
Engine truck	33 in.
Trailing truck	42½ in.
Journals, diameter and length:	
Driving, main	14 in. by 14 in.
Driving, other	12 in. by 14 in.
Engine truck	7 in. by 14 in.
Trailing truck	9 in. by 14 in.
Boiler:	
Type	Inverted wagon top; radial stays
Steam pressure	250 lb.
Fuel, kind	Bituminous
Diameter	92 in.
Firebox, length and width	150 1/16 in. by 102¼ in.
Height, mud ring to crown sheet, back	76¼ in.
Height, mud ring to crown sheet, front	95½ in.
Arch tubes, number and diameter	4—3½ in.
Tubes, number and diameter	87—2¼ in.
Flues, number and diameter	222—3½ in.
Length over tube sheets	21 ft. 6 in.
Grate area	106.5 sq. ft.
Heating surfaces:	
Firebox	302 sq. ft.
Combustion chamber	107 sq. ft.
Arch tubes	40 sq. ft.
Tubes and flues	5,455 sq. ft.
Total evaporative surface	5,904 sq. ft.
Superheating surface	2,487 sq. ft.
Total evaporative and superheating	8,391 sq. ft.
Tender:	
Water capacity	21,500 U. S. gallons
Fuel capacity	24 tons
Wheels, diameter	36 in.
Journals, diameter and length	6½ in. by 12 in.
Maximum tractive force:	
Rated	90,000 lb.
A. R. A. formula	93,700 lb.
Weight proportions:	
Weight on drivers ÷ total weight engine	0.69
Weight on drivers ÷ tractive force	3.93
Total weight engine ÷ total heating surface	61.3
Boiler proportions:	
Tractive force ÷ combined heating surface	10.72
Tractive force × diameter drivers ÷ combined heating surface	686
Firebox heating surface ÷ grate area	4.22
Firebox heating surface in per cent of evaporative surface	7.61
Superheating surface in per cent of evaporative surface	42.1

The Convention Party Comprised Nearly 500 Persons

Superintendents Meet at Memphis

Thirty-fifth annual convention developed much valuable information on transportation problems

Part I

APPROXIMATELY 250 division and general superintendents, trainmasters and other transportation officers met at Memphis, Tenn., on June 12-15 for the thirty-fifth annual convention of the American Association of Railroad Superintendents. As in recent years, the program brought out much information of practical value on the rapidly changing problems arising in the handling of railway traffic. Special interest was aroused by the attendance of 16 officers of the National Railways of Mexico, headed by J. J. Franco, general Superintendent of transportation. All sessions were presided over by J. M. Walsh (superintendent, Y. & M. V., Memphis) president of the Association, assisted by J. Rothschild, secretary-treasurer. For the first time in the history of this organization, an exhibit of materials and equipment contributing to efficiency in railway operation was presented in the lobby adjacent to the convention room. The details of this exhibit are given in the news section of this issue.

A distinct railway atmosphere was given the convention hall by the installation in one corner of a full size replica of the front end of one of the new Canadian Pacific locomotives working steam and in charge of a regular locomotive engineman. The various sessions were called to order by means of the "call in" signal, sounded by a regular whistle on this engine.

The report of the secretary-treasurer showed a total membership in good standing at the end of the year of 2,095, from 367 roads, the largest in the association's history. On the recommendation of the executive committee, membership of the association was opened to division and signal engineers, in recognition of their increasing interest in transportation problems.

A special feature of the program this year was the time given to the presentation, by means of moving pictures, of recent developments in operating facilities. Among the films shown were several on the centralized dispatching system, remote control switch operation and car retarders by the General Railway Signal Co. and the Union Switch and Signal Co. and others showing recent developments in locomotive design, by the Lima Locomotive Company and the Franklin Railway Supply Co.

At the concluding session of the convention on Friday forenoon, the following officers were elected for the ensuing year:—president, T. B. Wilson, vice-president and manager, Southern Pacific Motor Transport Co., San Francisco, Cal.; first vice-president, J. J. Franco, general superintendent of transportation, National Railways of Mexico, Mexico City, D. F.; second vice-president, C. E. Brower, general superintendent of transportation, Atlanta, Birmingham & Coast, Atlanta, Ga.; third vice-president, F. O. Whiteman, superintendent, East St. Louis & Suburban, E. St. Louis, Ill.; fourth vice-president, C. Forrester, superintendent, Canadian National, London, Ont.; secretary-treasurer, J. Rothschild, St. Louis, Mo. On the invitation of L. W. Baldwin, president of the Missouri Pacific and M. Cabrera, vice-president and general manager of the National Railways of Mexico, it was voted to hold the next convention at Mexico City.

Approximately four hundred persons gathered at the annual banquet on Thursday evening. President Walsh presided and presented as speakers Geo. Hannauer, president of the Boston & Maine, Robert B. Pegram, vice-president of the Southern, and Cliff Davis, commissioner, city of Memphis. Mr. Hannauer spoke on conditions in New England, refuting impressions about the decadence of that part of the country and describing the change that is taking place in its industrial life. He then reviewed the railway problems of New England, including the high proportion of passenger business, the high ratio of empty car mileage, inadequate facilities, etc.,

and described the measures that are being taken for their relief, stating that the Boston and Maine had alone spent $14,500,000 for improvements in 1926-27, while its budget for 1928 included appropriations for $16,000,000 more. Mr. Hannauer concluded his address with a number of observations of principles essential for success in railway service, among which he emphasized the importance of supervisory officers really supervising the work of their employees rather than drifting with them. Mr. Pegram spoke at some length on the early history of the railways of the South and particularly of the Charleston and Memphis, a pioneer line in the territory in which the convention was held.

L. A. Downs Emphasizes Responsibilities of Superintendents

L. A. Downs, president of the Illinois Central prepared an address on the present day problems of the superintendent, which, in his absence, was read at the opening session by W. S. Williams, general superintendent of that road and a former president of the Association. After recalling the fact that he became a superintendent by choice, having asked for a transfer from the position of assistant chief engineer maintenance of way to that of superintendent 18 years ago, Mr. Downs referred to the work of this officer in part as follows:

"I sometimes like to think," he said, "that the division superintendent holds a unique and an extremely fortunate position in the railway world. He is not too high up the official line to be out of intimate touch with local affairs; yet he is high enough up to be an executive in the best and finest sense of that much-abused term. He is down low enough to see the wheels go around; yet he is up high enough to be a man of general affairs, as contrasted with the specialists reporting to him as division officers—in short, he is (or should be) a well-rounded railway man, with responsibilities not only above and below but also within and without—that is, both to his company and to the public which it serves."

The conditions which govern a superintendent's work have changed greatly in recent years, in Mr. Downs' opinion. Indeed, some of them have changed markedly in the short space of less than 15 years since he was a division superintendent. "In this machine age," he said, "the routine part of the superintendent's work has been very greatly simplified by the provision of better power and more adequate facilities of all kinds. This is a better age because it is a machine age; but it is more than that—it is an age of understanding. With the coming of better tools with which to work there has come likewise a higher degree of intelligence in the operation of these tools, and one of the by-products of that higher degree of intelligence is a growth in the comprehension each man holds of the problems of his fellow man.

"Nowhere is this modern development of understanding more clearly illustrated than in the conduct of the railway business. Railway patrons today are fairer and more sympathetic in their dealings with the railroads than they were ever before, unless in the very earliest days of railway history. The railway employees, too, are closer to their employers than they ever were before; their improved understanding may be based in part upon a belated realization of their common stake with management in the success of the railway business in the face of the competition of other kinds of transportation, but it is none the less genuine for all that.

"Then, too, the human relationships of the superintendents have been lightened by an increased camaraderie between him and his superior officers. Practically all of the higher ranking railway officers of today have made their way up from the bottom rungs of the ladder, and their own remembrance of the troubles encountered on the way helps them greatly in sympathizing with and lessening the burdens of those coming along the way behind them. It is my observation that the higher-ranking railway officers of today devote themselves more to pleasing the public and to making conditions, if not easy, at least bearable for their subordinates than ever before.

"The superintendent is an important cog in the machinery of human relationship which revolves in and about the railway company. Having more time to devote to the finer points of his profession nowadays, he should be something of a human engineer, if we may coin that term for our purpose as one co-ordinate with civil engineer, mechanical engineer and the like."

Since there is little or no question about getting the trains to run nowadays, Mr. Downs urged the superintendent to study carefully the problem of making the most economical and otherwise efficient use of the plant which he has at his disposal. "The efficient and economical utilization of his plant is a matter vitally dependent upon the skillful handling of his personnel—the soul of the railroad, as I have sometimes said, in distinguishing it from the body, which is the plant. As a result of this dependence of plant upon personnel, I want to lay down one observation of my own which you may or may not wish to accept as a fact, depending on what your own experience dictates. Here it is: The superintendent who does the most for his own company is the one who best wins the co-operation of his employees."

Mr. Downs concluded his address with the following summary: some of the phases of human engineering in which the superintendent should specialize, in my opinion, are: first and foremost, safety—a matter which concerns both patrons and employees more than any other one thing and which touches the company both in the pocketbook and in the heart; second, economy of fuel and materials—a thing for which any household can offer homely illustrations; third, active solicitation of business—a work essential today in view of the many competing means of transportation; fourth, pride in the company and its family spirit—a feeling which must rest upon the confidence of fair treatment of employees; fifth, cordial relations with the public—something everyone can work at both by precept and by example but principally by the latter, remembering that no amount of words can take the place of satisfactory transportation performance in winning—and deserving—the commendation of those we serve.

Samuel O. Dunn Emphasizes Need of Public Support

Samuel O. Dunn, editor of the *Railway Age*, also addressed the members at the opening session. He emphasized the continuing necessity of making the greatest practicable efforts both to effect economies in operation and to secure a fair and constructive policy of railroad regulation. He called attention to the fact that the net return earned upon the total investment in railroad property in the first four months of this year was at the annual rate of only 4.32 per cent, or less than in the first one-third of any of the preceding five years, although total operating expenses were less than in the corresponding part of any of the last five years. He presented data showing that the efficiency of operation is now greater and railway service better than ever before and said:

"The managements of the railways are being confronted with the question of whether the public appreciates this kind of service and is willing to pay enough for it to make its continuance practicable. Practically every arbitration board organized under the Railway Labor Act has granted an advance in wages, and further advances are still being demanded. There is constant pressure for reductions of rates, although, owing to reductions of rates and losses of business to competing carriers on highways and waterways, the gross earnings of the railways were less in the first one-third of this year than in the corresponding part of any year since 1922.

"The situation presents problems which demand the attention of the entire railroad organization. Continued increases in efficiency and economy of operation are necessary, but they will not be enough. The public, through arbitration boards that fix wages and regulating bodies that fix rates, actually participates in the management of the railroads. Because of the good service now being rendered, public sentiment is more friendly than ever before, but its friendliness is negative. It applauds the railways for the good service being rendered and at the same time looks with favor upon reductions of rates, government-subsidized competition with the railways, and even direct government competition with the railways through the operation of the barge system on the Mississippi and other rivers. The friendliness of the public must be made positive instead of negative. It must be made such that the public will not only be glad to have good service, but will regard with disfavor whatever tends to prevent the railways from earning enough to maintain such service.

"Efficient operation depends upon the entire railroad organization. The same is true of the education of employees and the public to a reasonable and constructive attitude toward the railways. No class of officers is better situated to contribute both toward increasing efficiency and creating a positively healthy sentiment than the superintendents. The struggle to promote the prosperity of the railways and thereby enable them to serve the public efficiently and economically will never cease and it is up to the officers of all ranks and classes to recognize this fact and to be unremitting in their efforts to make the railways deserve public favor and to win the needed public support for them."

J. M. Walsh

President Walsh Encourages Study of Broader Problems

After reviewing briefly some of the problems of the Association, President J. M. Walsh incorporated in his address, presented on Tuesday, reference to the broader opportunities of a superintendent in meeting the newer conditions confronting the railways today. "I recall," he said, "the warning given us by that dean of transportation, R. H. Aishton, president of the American Railway Association, at our convention a year ago, in which, after complimenting us on our achievements and on the records broken, he quoted a text from the Bible that reads 'Beware of the day when all men speak well of thee.' There is nothing truer. When everything is apparently peaceful his advice to us was to 'go to it harder than ever, develop new methods, new ways, and a better understanding for those things that produce efficiency.'

"We have never had a greater opportunity to get nearer to the shippers of freight for the purpose of encouraging heavier loading of cars, and we should maintain close contact with the regional advisory boards throughout the various sections of the country. Superintendents should lend every possible assistance to these advisory boards, attend their meetings, serve on committees if called upon, and feel free to ask for assistance if any question should arise with reference to improving the service, by which means, in almost all cases, economy will also result for the carriers."

Mr. Walsh then turned to the newer forms of competition arising today. "We are entering a new era in transportation," he said. "I refer to air, truck, bus and water transportation. We are being confronted with new competition while regulated to an extreme by the government in wages, rates, hours of service, etc.,—in ways not generally applicable to other forms of transportation. Air transportation, sponsored by the government; water transportation, encouraged to the extent of millions of dollars in cash as well as free rights of way and arbitrary reductions in rates as between the railroads and river transportation—in other words, regulation on the one hand and independence on the other.

"We are being complimented on the dependability and improvement of our service in expediting traffic, as well as on the safety with which passengers are being handled by the railroads. Tremendous savings are being made in the transportation of freight from point of origin to destination and fabulous sums are being saved to the shipping public by reason of such service, but notwithstanding such service the allotment of millions of dollars by the government to water transportation can only be for the purpose of slowing up traffic by water that the railroad companies are being urged to expedite. It appears difficult to reconcile these conditions.

"Your attention is also called to the urgent demand on the railway companies to keep their engines and cars in the best possible condition at a time when equipment is being forced into idleness by reason of the subsidized transportation service that has come into being, and to which railway earnings are applied in large amounts in the way of taxes.

"You are largely interested in the problems of the

day, and the extent to which you may protect or assist in the advancement of the calling in which you are engaged should be given careful thought and consideration. The matters of increased wages, increased cost of supplies, the necessity of expenditures for maintaining the railways, which must be met from rates which have declined steadily for several years, should be of great concern to you at this time."

Referring specifically to waterways, "There has been much comment of late," he said, "with reference to the Mississippi-Warrior barge line operations. The railroads which are placed in competition with this barge service have to pay taxes, interest, upkeep, etc. If the government would assume for the railroads as much of their expense as it assumes for these river lines, there would be no question that the rail rates would be so low as to make river operations entirely useless.

"Is this fair to the railroads? The answer seems to be that there is no such thing as fair treatment of the railroads by the government. Prejudice which was wide spread against the railroads 20 years ago has now almost completely disappeared, but the official attitude of government regulation has not changed, and it continues policies based upon a public sentiment which ceased to exist long ago. Steeped in the thick political air of Washington, the Interstate Commerce Commission treats the vast machine of transportation as though it were a national enemy, paring down its earnings wherever possible and killing all spirit of enterprise.

"Notwithstanding the fact that the railways have earnestly and efficiently taken up the task of improving their service to the public, and are saving the public almost a billion dollars a year in the form of lower transportation charges through efficiency of operation, the Interstate Commerce Commission has failed lamentably to perform the duties imposed upon it by the Transportation Act to so regulate rates as to enable the railways to earn a fair return. In no year has the average return amounted to as much as the law enjoined, and in 1927 there was a decline in the return earned by every group of railways in the country.

"The crippling of railway service by lower freight rates will cost the people far more than they can hope to save as a result of reductions in rates. Adequate service is far more important than any possible saving in rates. Freight rates on American railroads are the lowest in the world today."

Expediting Car Movement in Terminals

A detailed report on the various ramifications of this subject was presented by the committee, of which A. G. Peck, general agent, Missouri-Kansas-Texas, Kansas City, Mo., was chairman. The introduction was given over to descriptions, by various members of the committee, of conditions existing in their terminals, as a result of which the committee made the following recommendations:

We feel that even at points where the through business interchanged is small, there is no place where there are as many as three or four or more lines where the intra-city or industrial business is being handled as speedily as it could be by having a joint place of interchange. The greatest advantage will be felt at points where a large number of lines end, such as Chicago, Minneapolis, St. Louis, Omaha, Kansas City, Cincinnati and New Orleans; but at any of the large centers where there are many industries it is a mistake to think that great benefit and advancing of the movement of both inbound and outbound loads will not occur where both inbound and outbound loads are handled by several, or many, lines for these industries.

Generally speaking, a joint arrangement is not necessary for the through movement of vegetables, fruits, packing house products, or live stock, except where only a few cars are being interchanged. Where these commodities are offered in large lots, or where the delivering line has a sufficient number of any kind of cars for the engines for one single line it is better to handle them direct; but for ordinary freight loaded by the thousand and one shippers throughout the country, the system now in use at most points should and can be improved.

A joint investigation by engineering and operating men in one city showed that a large percentage of the trains (except perishable), arriving in most large terminals have sufficient cars for their own industries, their house, team tracks, hold tracks, reconsignments, etc., to make some breaking up of the train necessary. While this breaking up is going on, the classification into blocks of all of the cars for each connecting line cannot be considered an amazing increase in the work necessary for the home road's present local needs.

It is our belief that the service will be much advanced and the total expense from the time of arrival at the switching point of the inbound line, to the point of departure on the outbound line, will be less. We are sure that the improvement in service will warrant the inbound line in bunching the cars for each road before taking them to the joint yard for delivery. This delivering engine can then back in on the track holding the cars for its road and depart with them with scarcely any delay, if sufficient delivery and running tracks (which in our opinion are the real key to success) are provided.

To illustrate the point we are endeavoring to make, at one large terminal 80 per cent of the trains arrive before 7 a. m. and 71 per cent of the trains leave after 9 p. m., while of the 29 per cent that leave before 6 p. m., 9 per cent are on roads that run through this terminal, leaving only 20 per cent of the trains that start from the terminal before 6 p. m. As a result, from 70 to 80 per cent of the cars in these inbound trains are delayed 13 hours or more in passing through this terminal. No such delay occurs with freight on a line that runs through these terminals,—its outbound trains being dispatched within one to three hours after the arrival of the inbound train.

A joint yard scheme is not new. It has been, and is being employed in some measure at a number of places. A small application of the principle is in operation at Des Moines, Iowa. But it is still the belief of many operating men that the full value of the principle involved—the continuous movement of all cars between point of origin and destination in the same manner as if the entire trip of the car was made on one district—has in some measure been lost sight of, and that continuous trips between the inbound and outbound train yards, or interchange yards is the real secret of through movement. There are enough cars in the inbound trains of most roads in the large terminals to make a good sized transfer, and if all lines get these to this joint yard promptly it will give the departure lines sufficient cars to enable them to advance their outbound trains from 6 to 12 hours.

Our conclusion is that if it were possible, under the individual delivery system, for each car arriving in an inbound train on every line to be classified and enough transfer engines employed to start for each delivery point within say 1½ hr. of the arrival of a train and arrive at outbound yards in 2½ hr., there would be enough cars in each outbound yard so that the average time that through cars would be in the combined terminals would probably not exceed three to five hours. This is not feasible because of the congestion that would result from increasing the number of movements and also because it would increase the expense to a prohibitive point; but by a properly arranged system of joint interchange facilities the number of movements, or engines, could be decreased so as to make the present connections between lines ample for a long period, and decrease the combined cost more than sufficient to pay interest on twice the cost of the joint plant.

Flat Rates for Transfer of Cars

This committee also reported on the advisability of establishing flat per-car rates for the transfer and adjustment of loads, as follows:

The information received by this committee on the cars transferred in the month for which it asked that the record be kept at the various terminals, shows the cost for transferring different commodities varies so widely that it is unfair to throw all commodities into one flat rate.

The committee therefore, recommended:

1. The adoption of two flat rates to be agreed upon at transfer points to cover commodities which require high cost to transfer and those which cover commodities that are transferred at a low cost.
2. Commodities to be grouped between:
   (a) Those which require high cost to transfer.
   (b) Those which are transferred at a low cost.
3. The flat rate for each classification not to be more than the

average labor cost for commodities grouped in 2-A and 2-B, as found by ascertaining the average cost for commodities transferred in their respective groups for a period of six months, this period to be mutually agreed upon.
4. Maximum charge for per diem of $1 for the bad order car only.
5. Allowance of 50 cents per car for clerical labor on loads transferred.
6. No charge to be made for switching service.

In the matter of a uniform charge for the adjustment of loads that are offered by the delivering line and found by the receiving line to be unsafe for movement due to broken side stakes, loads shifted over ends or sides of car, or loads in distress in doorways requiring adjustment and doorway protection, the actual cost of making these adjustments to be arrived at at interchange points in the following manner:

1. Adopt two flat rates, to be agreed upon at interchange points, one to cover commodities which require high cost to adjust and another those which cover commodities that can be adjusted at a low cost.
2. Commodities to be grouped:
   (a) Those which require high cost to adjust.
   (b) Commodities which are adjusted at a low cost.
3. The flat rate to be not more than the average labor cost for commodities grouped in 2-A and 2-B for adjustments, as found by ascertaining the average cost for commodities adjusted in their respective groups for a period of six months, this period to be mutually agreed upon.
4. No charge to be allowed for per diem on loads adjusted.
5. Allowance of 50 cents per car for clerical labor on loads adjusted.
6. No charge to be made for switching service on loads adjusted.

No allowance is suggested for switching because this is so indefinite and except in very infrequent cases the car is not handled alone but in combination with other cars, making the actual cost of handling the car to be transferred small, and the further fact that in most places this will even itself up between lines, and also helps equalize with other work, such as reciprocal transfers, etc.

Discussion

This report aroused active discussion. Several terminal superintendents told how the movement of cars had been expedited through joint yards by the elimination of interchange inspection. At Clearing Yard, Chicago, it was reported that this has saved $35,000 annually and reduced the time for interchange two hours. When the Terminal Railroad Association of St. Louis adopted this practice it laid off 67 inspectors. H. F. Sutherland, superintendent Kentucky and Indiana Terminal, Louisville, Ky. described an arrangement devised at that point whereby an engine of a delivering line becomes the property of the receiving line as soon as it comes on its rails. Under this practice all time lost by a locomotive while off its line is charged to the line causing the delay. All delays are equalized at the end of each month and settlement made at the rate of $12 per hour. This has greatly reduced the time required in interchange.

Avoiding Damage to Freight

A report on the careful handling of freight was presented by a committee of which C. L. Harris, superintendent, Canadian National, Virginia, Minn., was chairman. An abstract of this report follows:

This association should strongly recommend that railway executives use their most earnest efforts toward bringing about the earlier closing of receiving warehouses, thereby increasing the interval between this closing time and the scheduled departing time of manifest trains. It is recognized that a high percentage of damage to freight is caused by the rough handling of cars in switching operations, and it is the belief of your committee that much of this rough handling is the direct and natural result of the limited time allowed for switching house yards, moving cars to make-up yards, and marshalling them into trains. It is also recommended that the set-up on the house tracks be made in station order to reduce the switching necessary to line up cars in station order in trains.

While it is recognized that most switching yards are in fairly good shape as regards physical conditions and lighting, there is still room for improvement, particularly as regards the latter. The better a yard is lighted, the more efficiently can the work of switching be done, thereby preventing the unnecessarily hard impact of cars, which, in turn, minimizes the damage to the cars themselves and to their lading.

While the economy and efficiency of hump switching as compared with flat switching is well recognized when the number of cars to be handled justifies the payment of the required number of riders, the committee feels that the successful use of retarders instead of riders makes it economically possible to convert many flat switching yards, where 24-hour service is necessary, into hump yards, thereby not only speeding up switching operations but minimizing damage to equipment and lading due to the better control of cars as compared with either rider humps or flat switching.

Almost equal in importance with the above recommendations is the thorough and proper inspection of cars before placing for loading and before forwarding in trains when received from connections, this inspection to include car bodies, hand brakes and air brake apparatus, making certain that the hand brakes will properly control the movements in switching, and that no car is permitted to go forward with air brakes in such condition as to cause undesired emergency applications of the brakes.

Next in order of importance in inspection is the journal boxes, to see that there is the proper amount of lubricant to prevent journal heating, which is not only a menace as regards accidents but is a most fruitful source of delay, not infrequently causing brakes to be applied from the rear of the train when evidence of hot journals is discovered and stop signals are not seen quickly by enginemen.

Proper switching in yards and handling on line of road are of the greatest importance. The committee felt that the Atchison, Topeka & Santa Fe instructions, contained in a pamphlet entitled "Switching Rules for Guidance of Trainmen, Enginemen and Yardmen," embody thoroughly safe and practical suggestions which, if followed by enginemen, trainmen and yardmen, will go far toward minimizing avoidable damage to equipment and lading; the committee felt that, in addition, some suggestions of its own might properly be included in this report. These suggestions are:

Use every means possible to educate yard foremen and switchmen in the art, and it is an art, of giving proper signals and at the proper time, allowing enginemen opportunity to act upon them in a reasonable and rational way, thereby preventing unnecessarily quick stops, which, with the heavy cars and engines now in use, cause hard jerks and the impact of one car with another, resulting in the undue straining or fracturing of draft gear, which, in some instances, does not develop in the yard, but gives way later on the road, causing the separation of trains with the consequent shock of an emergency application of brakes.

Use all means possible to educate enginemen in the careful and proper lookout for an observance of switching signals, both in yards and on the road. Furnish them with, and encourage them to study, the Santa Fe rules above referred to, and, in addition, inculcate a spirit of friendly rivalry to see which engine crew shall have the best record for efficiency, which, of course, includes freedom from damaging equipment.

Keep yardmasters and yard employees thoroughly posted as to the amount of damage to equipment in each yard, and also keep trainmen and enginemen advised of road damages. By means of educational bulletins, personal contact, investigation of rough handling in yards and on the road, not only keep alive but intensify to the fullest extent the interest of all concerned in the efficient and proper handling of cars in yards and of trains on the road. Keep ever fresh in the minds of employees the fact that losses due to damage to equipment and lading are irrecoverable so far as net earnings are concerned, and curtail the resources of a railway, which losses, in turn, are reflected in restricted ability to improve physical conditions and leave a road to follow instead of lead its competitors in the matter of service, thereby lessening the volume of business it can reasonably expect, which, of course, correspondingly decreases the earnings of employees in train and yard service.

Discussion

In the discussion of this report numerous constructive suggestions were offered. F. M. Benning, vice-president and general superintendent of the South Buffalo railway, Lackawanna, N. Y., attributed much of the trouble to the failure of certain details of car construction to keep pace with the increasingly severe service required of them, and urged that a critical study of this question be made with mechanical department officers. Other members pointed to the effect of long trains, deficient training of men and impact resulting from the

running in and out of slack as contributing to this damage. M. F. Steinberger, special engineer, B. & O., refuted the latter, stating that a two-year study of impact register records on his road showed that less than 10 per cent of the shocks occurred on the road as compared with more than 90 per cent in yards. Other members reported on the advantageous results that have come from the more careful loading of commodities and their bracing in the car.

Hump Yards Versus Flat Yards

A committee, of which F. G. Swofford, general superintendent, Indiana Harbor Belt, Gibson, Ind., was chairman, presented a report on the relative advantages of gravity and flat yards as follows:

Where the number of cars handled per day does not exceed 700 and the number of classification tracks is not more than 20, flat yards are very satisfactory when the switching leads are arranged with tandem switches and other conditions are favorable. In flat yards comprising 10 or more classification tracks these tandem switches are most desirable as they shorten the leads appreciably which, of course, permits more cars to be disposed of in one forward move of the engine. On leads of this kind, where there is not excessive interference and where the cuts average 1½ cars, about 40 cars per engine hour should be classified when one engine is used while, where two engines are used, the average per engine hour will be reduced to 30 cars. The difficulty with flat yards generally is that there is too much interference and delay to the switch engines at one or both ends of the yard on account of trains pulling out or other necessary engine movements.

In small yards where the peak period problem has to be solved, or where the movement of time freight requires an especially rapid classification, the small hump equipped with car retarders is the solution.

While it is true that each yard presents an individual problem, the relative cost of hump or flat yard operation can be determined very closely by a study of engine hour costs. There is a great deal of reliable information available on this subject. If the savings resulting from reduced engine hour costs in hump operation equal six per cent or more of the cost of converting a flat yard to a hump yard, or of building a hump yard where a new facility is being provided, the hump yard should receive favorable consideration, as it is more adaptable to expansion.

Experience teaches that with a properly operated gravity yard less car damage will result than with flat switching. The injury hazard is about the same in flat and hump yards except in hump yards equipped with car retarders where the personal injury hazard does not exist.

In the foregoing we have set out the direct comparisons between flat and hump yards. However, we realize that it is now necessary to consider the gravity car retarder method of classification. Although the car retarder has passed the experimental stage there are many new developments in its application in hump yard design. It has been found that even small capacity hump yards can be adapted to the car retarder with resulting economies in operation. In these small yards the classification tracks may be grouped so that there is a greater number of small compact leads or ladders. This arrangement allows a quicker separation so that the problem of spacing the cars does not operate to slow up the work to the extent that is experienced in yards with fewer long ladders.

With the working out of the correct grades from the crest of the hump down into the classification tracks and the grouping of tracks as explained, fewer car retarder control towers and operators are required.

The report then summarized the design and operation of Clearing, Markham and Blue Island yards of the Belt, Illinois Central and Indiana Harbor Belt railways, respectively, at Chicago. The operation of Clearing yard was described in the *Railway Age* of June 4, 1927, Markham yard on April 17, 1926, and Blue Island yard on February 26, 1927.

To illustrate the economies that can be brought about through the introduction of favorable grades in flat switching yards, the committee referred to the improvement that has been effected along this line in the Wabash yards at Oakwood, Mich. At this point there are dead freight, manifest and miscellaneous classification yards.

In the dead freight yard the grades have been arranged so that there is a 2 per cent grade in the first 100 ft. of the lead, followed by a 0.5 per cent grade to the last switch on this lead.

In the manifest yard the lead begins with a grade of 1 per cent for 100 ft., then reduces to 0.4 per cent, which continues to the last track on this lead. By introducing these favorable grades the number of cars switched per engine hour has been increased in the dead freight yard from 10.6 cars to 18.2 cars or 71.6 per cent.

Discussion

This report stimulated a great deal of interest. In commenting on the reduction in personal injuries brought about by the installation of car retarders F. T. Gibbs, freight trainmaster, I. C., Chicago, stated that since the retarders were placed in service in Markham Yard, Chicago, two years ago there had been no personal injuries until three weeks ago when a man was fatally injured. He also emphasized the greater regularity of service that is possible during bad weather with this equipment. C. A. Mitchell, division superintendent, N. Y., N. H. & H., Hartford, Conn., stated that the New England roads have recognized the value of car retarders in expediting the handling of freight more generally than those in any other section of the country, the New Haven having installed them in five yards and the Boston and Maine in three.

In reply to a question regarding the effect of cold weather on the movement of the cars, Mr. Gibbs stated that in extreme cases it had been found necessary to pull strings of cars out of the receiving yard and then back to the hump in order to thaw the lubrication before sending them through the retarders.

Extending Locomotive Runs

A committee, of which P. F. McManus, general manager, Elgin, Joliet & Eastern was chairman, presented the following report:

The practice of extending locomotive runs over two or more engine districts has now been sufficiently tested by the railroads of this and other countries so that it may be truly said to have passed the experimental stage. From the results obtained on the large number of railroads using this practice it can hardly be denied that large savings may be made by extending locomotive runs.

In general, the extension of locomotive runs has had the effect of greatly increasing the average mileage per active locomotive. A survey of the roads where this practice exists shows that with proper attention as to the assignment, selection and maintenance of locomotives the average monthly mileage of such locomotives may be materially increased.

One of the things which has held back the development of extended locomotive runs is the idea that the cost of repairs would be greater under this practice than otherwise. In this connection, it may be well to quote from the statement of a mechanical officer who has had nearly three years experience with the practice:

"Of course, it is a fact that there will be more work to do on a locomotive after it has made 350 miles than after it has made only 100 or 200 miles; but there is no serious effect on the locomotive. In fact, I am quite sure that the amount of boiler work is decreased, due mainly to the fires not being knocked so often, which starts boilers leaking to a certain extent, so the effect (stress due to expansion and contraction) on the boiler is not so great as it was prior to long run service. The upkeep of machinery is increased slightly per locomotive handled at terminals where the engines are maintained, due to the increased mileage, but the decrease at intermediate points is sufficient to effect a saving in enginehouse expense and engines handled over the short run operation."

Another idea which has been proved erroneous is that coal-burning locomotives are not suitable for use in extended engine runs. A number of tests were made some two or three years ago to determine the extent to which coal-burning locomotives could be used in long run service. These tests indicated that coal-burning locomotives can be operated past intermediate terminals and over as great distances as oil burners, as far as

fire conditions are concerned. The tests convinced skeptics that coal-burning locomotives are suitable for extended engine runs and the performance of the locomotives in actual everyday operation since that time has borne out the results of the tests in every detail.

The report then quoted performance records in extending locomotive runs on the Illinois Central, the St. Louis-San Francisco, the Northern Pacific, the Southern Pacific and the Chicago, Burlington & Quincy in this country, as well as the National of Mexico, and the London, Midland & Scottish and London & North Eastern in England. Statistics on all of these performances have previously been given in the *Railway Age*.

The use of extended engine runs in freight service has naturally, of course, been somewhat more restricted as to mileage than in passenger service. Nonetheless, some of the railroads have been making great progress in this direction and more and more railroads are adopting the practice of extending freight engine runs.

One of the important features in planning extended freight engine runs is the question of tonnage-breaking points on railroads where these exist. Before a system plan of extending engine runs can be worked out a careful study is required to have the runs coincide as much as possible with the tonnage-breaking points, as it has been found that there is little efficiency in running a freight engine through a tonnage-breaking point.

In freight service the increased utilization of locomotives is possibly more important than in passenger service and a number of the railroads that have tried the extended engine run plan have found that they are able to increase their tonnage per train by reason of the greater utilization obtained from their heavy locomotives. For example, if a railroad has 50 heavy Mikado locomotives, under extended runs these locomotives may be spread so as to cover a much greater number of runs with a corresponding increase in the tonnage per train.

The data obtained in regard to extended engine runs indicates beyond doubt that this is a fertile field for economies of operation and increased capacities for a given number of motive power units. The extending of locomotive runs has the effect of reducing the number of locomotives required to handle a given business and therefore increases the capacity of the road and enables it to handle a greater volume of business with the same number of power units. Locomotives on extended runs are kept in active service a greater number of hours per day without a corresponding increase in the number of hours out of service for maintenance. Among the economies to be derived from extended locomotive runs is the elimination of small intermediate terminals made possible by running engines by them, the elimination of the waste of fuel by cutting off locomotives and the maintenance and enginehouse costs at such terminals. The governing factor in extending locomotive runs, is almost entirely a question of proper maintenance at the dispatching terminal and proper care in handling and operating enroute regardless of the fuel, water, or physical characteristics of the road.

Motor Coaches, Trucks and Rail Cars

A special committee, of which M. F. Steinberger, special engineer on the staff of the operating vice-president of the Baltimore & Ohio, was chairman, presented a report on "The Motor Coach and Motor Truck as Auxiliary Agencies in Railway Transportation and the Motor Rail Car's place for Main Line and Branch Line Service" from which the following was abstracted:

There have been no startling changes in the status of motor transportation during the last year. The use of motor coaches and motor trucks continues to increase. More railroads are using them, thus indicating an increasing realization on the part of our executives that automotive vehicles have a definite place in the transportation field and a willingness to use them in their proper place. Motor coach and truck design continues to improve, which increases their adaptability to various transportation needs. Better design means lower operation and maintenance costs, which in turn tends to broaden their field of usefulness.

It will thus be seen that the problem continues to be a grave one and that no proper action should be neglected which will have the effect of lessening the revenue losses to the railroads resulting from the increased popularity of this type of transportation. Within the past year the situation has become worse through the increasing growth of competitive lines operating for long distances, which lines are operating in all parts of the country. The committee can only repeat its former recommendation that the railways make use of this method of transportation where they can do so, even for comparatively long distances. One instance, that of the new Haven in its operation of a motor coach line from New York to Boston, shows the possibility of successful operation in that direction.

Our investigations have indicated that the use of the motor trucks for longer distances is also increasing. For instance, in the West, live stock is carried for long distances to stock yards by truck instead of by train. Farm products are being handled in the same way. Your committee feels that some of the further drift of traffic away from the railroads may be averted by more intensive and more general solicitation on the part of all railway employees rather than only by the soliciting forces.

One of the most important steps which can be taken is to attempt to have the same regulations as to schedules, rates, safety appliances, taxes, financial responsibility, etc., which apply to the railroads, extended equally to motor transport operations.

It is the opinion of the committee that the railroads should use the coach and truck as auxiliary methods of transportation and should recognize the desirability of automotive vehicle use in its ordained place, but should at the same time endeavor to eliminate unfair competition, when that competition is given through the advantages gained by the motor transport companies in the way of unregulated operation as to rates, taxes, etc.

There can be no justification for objection to competition which is economically sound, and the committee feels that to offset that competition the railroads should use the same tools and give better service than their competitors.

The committee then reviewed briefly the report of the Interstate Commerce Commission on its motor transport investigation, which was published in the Motor Transport section of the *Railway Age* of January 28, 1928.

Rail Motor Cars

Among the expedients adopted by the railroads to meet the losses in passenger revenues, particularly on branch lines, has been the adoption of the rail motor car. Most of the larger and numbers of the smaller roads are using such equipment. The experience of all of the roads has been alike in this respect. It was found that passenger trains were being run at out-of-pocket costs of from about 80 cents to $1.25 per train mile, while revenues were materially lower. Frequently it has been impossible or inadvisable to abandon service on the runs involved, and the adoption of the rail motor car has been the result.

The first cars purchased were generally the straight gasoline engine mechanical drive cars costing about $30,000 each. Gradually there has been a drift from the mechanical drive car to the gas-electric car, which, while costing more, has greater flexibility and ease in operation. Statistics indicate that operating costs range from 40 to 65 cents per mile (including interest and depreciation), depending upon physical characteristics of the road and the mileage necessary to be made. Larger and more powerful cars continue to be built, thus broadening their field of usefulness.

Conclusions

In general, the committee feels that the following yardstick might well be used:

(a) Where steam trains are earning less than 20 cents per mile and there is little hope of doing better than that by any means of conveyance, efforts should be made to eliminate the service entirely.

(b) Where there is a possibility of earning over 20 cents per mile, the motor coach should be used wherever possible, assuming that other traffic considerations, as to baggage, etc., can be met.

(c) If motor coaches cannot be installed and the earnings possible appear to be about 40 cents per mile or better, then rail motor cars should be used up to the limit of their ability to perform the service required.

(d) If earnings of about 40 cents per mile or better do not appear possible and motor coaches for one reason or another cannot be substituted, efforts should be made to eliminate the service.

(e) Wherever a recommendation is made for the elimination of service, full consideration should be given the needs of the territory involved. It is not the purpose of this committee to recommend any action which will work a positive hardship upon any community. Each case should be decided on its merits, and common sense, cold logic and a realization of the results, both to the communities and to the railroads, considered carefully before any action is taken.

(The remainder of the report of this convention will appear in the next issue.)

Missouri Pacific Centralizes Scrap Handling and Salvage

Lift trucks and low sorting costs feature new operations at Sedalia

Handling the Miscellaneous Scrap—Note Method of Loading Sorted Material

THE Missouri Pacific has been improving the condition and work of its stores with marked results. As recently as October, 1926, scrap handling for the system was concentrated at Sedalia, Mo., and a reclamation plant has been developed there. Low sorting costs feature the scrap yard operations, while work in the reclamation plant and stores is featured by payroll reductions brought about by introducing self-propelled lifting trucks.

A gantry crane, of 105-ft. span and 20-ft. overhang at each end, is employed in the scrap yard. This crane has a hoist capacity of 15 tons and operates a 65-in. magnet. It has a 2,100-ft. runway, with a track on each side for cars. About 10 cars of miscellaneous unsorted scrap are brought to this yard daily, which this crane, working at night, unloads at the rate of a car each 35 minutes. Some use is also made of locomotive cranes for this purpose. During the day, the crane is at the service of sorters and cutters who separate the materials into marketable classifications and either throw it or have the crane pick it up and drop it into sorting boxes placed along the edge of the yard adjacent to the loading track, the other track being restricted to unloading. The boxes are 6 ft. wide, 12 ft. long and 3 ft. deep, providing capacity for about eight tons. They are open at one end and hold the smaller assortments of scrap or reclaimable material until a carload is available, when the crane lifts them bodily and empties the contents into the car in one operation. The aim is to unload, sort and reload incoming scrap in 24 hours, avoiding accumulation.

Handle Scrap for 65 Cents Per Ton

The iron and steel scrap is not worked over at the Sedalia plant as much as on some roads, but 42 different classifications of miscellaneous scrap (not counting wheels, axles, rail and brass) are prepared for sale in addition to 500 tons collected monthly for use in the reclamation plant. For the year 1927, this scrap was handled at a cost of 64.4 cents per ton, counting only operating charges on the tonnage received, while the cost in December was 53 cents computed as follows:

Miscellaneous Scrap

Labor to unload, sort and load	$2,725.53	
Coal for cranes	58.87	
Water for cranes	3.74	
Lubricants	13.09	
Electricity for gantry crane	109.71	
		$2,910.94
Tons miscellaneous scrap received		5,527.00
Cost per ton handling		$ 0.5268

A total of 5,102 tons of scrap was sold in December, which was classified as follows:

Scrap	Tons	Scrap	Tons
Castings and forgings	194.4	Iron axles	34.8
Splices and angles	499.0	Heavy sheet, cut	302.99
Couplers and knuckles	138.8	Turnings and borings	146.2
Brake shoes	167.4	Turn table	29.45
No. 2, cast steel	88.15	Boiler and tanks	23.8
Brake beams	25.55	Misc. bridges	38.5
Malleable iron	86.45	Channels, angles	189.95
Steel axles	61.7	Destroyed steel cars	133.25
No. 1, cast iron	139.5	No. 1, wrought iron	675.5
No. 2, wrought iron	506.94	Wrought malleable and cast	654.1
Bolsters and side frames	262.85	Bolsters	37.15
No. 4, cast iron	72.95	Draft arms	212.65
Iron and steel arch bars	97.5	Light sheet	45.3
Tires	47.6	No. 3, cast iron	39.45
Springs	43.1	Flues and pipe	125.45
		Total	5102

The above cost does not cover that of handling scrap rail or any wheels except those that reach the yard in wreckage. All second-hand or scrap rail removed from track is now shipped to Sedalia but this is handled in a separate yard, using locomotive cranes. Here all incoming rail or fastenings are unloaded, separated into second-hand and scrap material, and all the scrap prepared and loaded for market under proper classifications at a cost, in December, of 28.61 cents per ton, determined as follows: Labor, including foremen, $627; coal for crane, $171; water for crane, $10; lubricants, $7; or a total of $824 for 2,882 tons. The tonnage sold amounted to 2,786.

Locomotive cranes are also utilized for handling scrap wheels at Sedalia, of which 311 tons were handled in December at a cost of 3.958 cents per ton, figured on the same basis as the foregoing.

All Reclamation Under One Roof

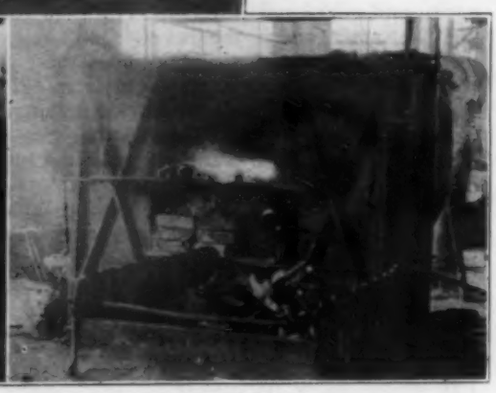
A single building, 40 ft. wide and 500 ft. long, is provided for reclamation operations. Where the width has proved insufficient, the walls have been extended, but, in keeping with the best practice, all operations are carried on under one roof. This building is not of imposing appearance but it has a high roof and a concrete floor. The storage area outside of the building is also paved with concrete while inside the building every machine is arranged to promote economical production and allow modern material handling.

The machinery comprises an 8-ft. cornice brake, a splitting shear, a 20-in., a 36-in. and a 40-in. roll, a seam and setting down machine, a clipping machine, a grooving machine, a 30-in. folding machine, 30-in. shear, two burring machines, a circular cutting shear and a block punch and shear for tin and light metal work; a band saw, a wood post boring machine, a 12-in. rip saw, a Universal wood-working machine, a stake-pointing machine, a wood-turning lathe and a jig mortising machine for carpentry work; a drill press, an electric welding machine, a Dexter valve reseating machine, a brake beam press, a brake beam assembling table, five bolt cutters, two bolt headers, six oil heating furnaces, a portable alligator shear, a Beaudry hammer, two shapers, a 1,000-lb. steam hammer, a Pell shear, a 6-spindle nut tapping machine, a combination metal shear and punch, a rod straightener and a 24-in. lathe for machine shop, blacksmith and other classes of work.

Although a branch of the stores department, the reclamation plant is in charge of a superintendent of reclamation who is a former master mechanic. Operations comprise the reclaiming of material found in scrap and the repairing of tools and equipment accumulated by the stores, and also the manufacture from old material of various articles called for on special orders issued by the stores. An itemized record of the various charges for labor and material for each job is kept and summarized each month in a statement which also gives the saving over purchase prices, except in the case of strictly repair work; for instance, the rebuilding of motor cars, where no saving is computed. During the month of February, the last available report at this writing, the output, valued at purchase prices except as indicated, amounted to $66,537 which was procured at a cost of $49,017 for labor and material, including $6,277 strictly repair work, leaving a difference of $17,520, or 25 per cent to be applied as a credit to company operating expenses.

Babbitting Journal Bearings

Inspected Journal Bearings on Skids Ready for Delivery by Lift Truck



The Reclamation Plant Has a Concrete Floor—Repairing Clay Picks

Switch lamps awaiting repair are first cleaned in a vat of hot lye at Sedalia, this having been found important to finished workmanship. Brass valves and fittings, quantities of which are found in the scrap, are given a lye bath, then a muriatic acid bath, then a nitric-sulphuric acid bath and finally a potassium cyanide bath, so that when tested they cannot be distinguished from new supplies.

A Motor Car a Day

Motor cars are rebuilt at this plant at about three-quarters the cost of new equipment. The production of cars, fully repaired and painted, averages about 20 cars a month and the work is done so well that the

first complaint of faulty workmanship has yet to be received. Instead of running the car back and forth on a proving track when the mechanical and carpentry work is done, each car is placed on a test rack connected with a motor generator. The car is first operated by the motor and then under its own power. In this operation the motor generates electricity. This current is recorded on an ammeter and voltmeter from which the horse-power of the engine at various speeds

Brake Beams Found in Scrap Are Piled on Portable Racks

can be quickly calculated. The panel board to which the ammeter and voltmeter are attached carries a speedometer and a bell circuit is also provided for testing the insulation of the car. If the insulation is so defective as to affect a track signal circuit, the bell will ring.

Clay and tamping picks are not only drawn out to a point at Sedalia, but are welded if necessary, using tire steel. Track chisels are heat-treated, using oil furnaces, and guard rails are made from old rails by bending hot, after which the bevel is cut at each end by torch, using a templet to guide the flame. All machine bolts in stock are made at the plant from old iron, which is straightened in a machine having an angular contact plate which enables one man to straighten 4,000 lb. of bar iron a day. The plant also manufactures cleaning compound for use in sweeping office floors. The sawdust from the mill is put into a cylinder, disinfectant added, and the cylinder revolved mechanically for 15 minutes, producing 300 lb. of cleaning mixture which is furnished at a cost 30 per cent less than purchased materials.

Repairs to brake beams and journal bearings are among the two largest operations of this plant, the output amounting to approximately 1,500 brake beams and 226,000 lb. of journal bearings in February. A complete babbitting process has been developed for the latter. The old babbitt is removed by melting. It is then refined and reapplied in two molding machines, each of which handles two bearings at one operation. The brasses are surfaced in a special shaper and subjected to individual inspection. A force of 15 men do this work at a saving of $6,000 a month.

Lift Trucks Save Handling

The outstanding feature of the Sedalia operation is the handling of materials. The policy to which the stores department is now working, of keeping material off the floor from the time work has begun on it until its delivery for shipment or use, has been carried far in reclamation work. Carts on wheels or portable platforms are stationed at every machine or forge where material is required or produced and lift trucks transfer these from place to place.

When brake beams are picked out of the scrap, they are not piled on the ground, but on a portable rack which has been placed in the yard for them. These racks are specially constructed from scrap iron bars to hold 75 brake beams each. When loaded they are hoisted, three at a time, by the gantry crane and delivered to the reclamation plant, where a lift truck of three tons carrying capacity picks them up and transfers the load to the assembly table. As the beams are repaired, they are again placed on a rack. If intended for use locally, they are carried directly to the concrete paving outside of the plant or to the point of use. When loading cars, a rack with a carrying capacity of 50 brake beams is used and this rack is left in the car. At present a lift truck and operator load a car of brake beams in two man-hours, an operation which previously required 16 man-hours.

In handling scrap brass castings, a box made of 2-in. oak lumber, 36 in. wide, 44 in. long and 18 in. deep is used, which is supported 13 in. above the floor on legs made of scrap angle bars, arranged so that the lift truck can be negotiated from the end or side. As the scrap brass accumulates at the stores, it is placed in these boxes, weighed and loaded into the cars by lift truck. At the brass foundry the contents are unloaded and the skids reloaded with new brass castings and shipped direct. The operation of loading and weighing one carload of brass, using the lift truck and an operator, requires only 1½ man-hours. When laborers and warehouse trucks were used, it required 24 man-hours.

In rebabbitting journal bearings, the journal bearings

Lift Truck Enroute to Store House with Finished Brake Beams

are passed directly from the boxes into the melting vat, from the melting vat to another box, from the box to the molds, from these molds to a box, from this box to the shaper and inspection table, when they are then again placed in a box or on a low platform for shipment, the lift truck doing all moving, including the stacking of loaded boxes on each other or even transferring them to four-wheel trucks where desired.

The Missouri Pacific installed three lift trucks a year ago in the stores and reclamation work. In the reclamation plant where one lift truck is employed constantly, it was possible to release 13 men at the time of the installation and this number has since been increased to 20. In addition, the plant operations have been greatly expedited.

Railroad Consolidations And Traffic Routes*

Amalgamations formed, not primarily to effect economies, but to get more business

Part I

By Dr. Julius Grodinsky,
University of Pennsylvania.

AMERICAN railroad traffic moves largely over two or more lines. There are few roads that connect many sources of production with many consuming markets. Those roads which originate cotton in Texas do not generally reach Chicago and those which penetrate the oil fields of Oklahoma do not generally reach the consuming markets north of the Missouri River. Again, the roads which receive the miscellaneous manufactures from the New England mills and factories have no tracks of their own beyond the Hudson River.

Yet the trade and commerce of the country require the continuous exchange of commodities between the agricultural south and west, and the industrial east. The citrus fruit of the Rio Grande Valley of Texas and of the Salt River Valley of Arizona must be brought to the breakfast table of the citizen in the Delaware River and Ohio River Valleys. The farmer in the southwest requires the agricultural implements manufactured in the central west; and the mills of New England are helpless without the cotton from the South.

There are no roads, however, which connect areas of important raw material south of the Potomac and Ohio and west of the Mississippi Rivers with consuming areas east of the Alleghenies. And there are but few lines joining the markets of the Middle West with the great sources of mineral and agricultural wealth of the South and West. The Atchison, Topeka & Santa Fe does operate from San Francisco to Chicago via Kansas City; and the Chicago, Milwaukee, St. Paul & Pacific does control a through line from Chicago to Seattle. These are, however, the notable exceptions. The great southwestern carriers—the Missouri Pacific, the Missouri-Kansas-Texas, the St. Louis-San Francisco—stop short at the Mississippi River. The Union Pacific, with its loaded cars of grain, lumber, and fruit, comes to a halt at the Missouri River. The Southern Pacific cannot operate its own trains of fruit, oil and cotton beyond New Orleans in the southeast and northern Texas on the north. The major southeastern lines do not cross the Potomac; and so cannot carry the food and the raw materials of industry into the centres of large population and intense industrial activity. The New England lines are isolated entirely. They reach neither the mines which supply the coal required for the operation of their factories, nor the communities which furnish the outlet for the articles made by their industries.

The corporate entities, in short, controlling separate railroad lines, cannot by themselves satisfy the economic requirements of the nation. Cooperation between the several privately-owned lines is imperative. Cotton consigned to New England from the southeast must be transferred to a connecting carrier at some point south of the Potomac, and, in turn, handed over by the latter to another road at some point south of the Hudson. And, similarly, a carload of grapes from San Francisco to New York, loaded initially by the Union Pacific, is transferred most probably, to the Chicago & North Western at Omaha, and delivered, probably, by it to the New York Central at Chicago.

But why is it probable that the Chicago & North Western will receive a train from the Union Pacific? Why not the Chicago Great Western, or the Chicago Burlington & Quincy, or the Chicago, Milwaukee, St. Paul & Pacific? Such questions may be asked at almost every important point of interchange. The consideration of this question strikes at the root of the railroad business. It is in this phase of railroad traffic that competition among the carriers becomes keen and even bitter.

Junction Points and Railroad Competition

The large junction points are competitive from the transportation standpoint. They are served by two or more railroads. From one side comes a train of loaded cars. The tracks of the road on which the traffic originates may stop at this point. The lines of seven railroads (such is the case at Omaha) may connect with the originating line on the other side. The trainloads of wheat gathered by the Union Pacific in Kansas are carried to Omaha, while the lumber gathered by the Northern Pacific in Washington is carried to Minneapolis. But both wheat and lumber are consigned to Chicago. What line shall carry the wheat from Omaha and the lumber from Minneapolis?

The traffic density of all the lines connecting Omaha and Chicago is comparatively thin. They all could carry large volumes of additional traffic without any strain on the existing plant. And they all want the business. But they do not all get it. Some get none, some get a little, and others get a large share. Indeed, at many junctions, it would appear that the old Biblical principle that "For whosoever hath, to him shall be given, and he shall have abundance; but whosoever hath not, from him shall be taken away even that which he hath," is still in operation.

The importance of all this is emphasized by the large volume of traffic that is interchanged among American railroads and by the large earnings realized therefrom. Data for the roads of the country as a whole are not available, but figures for individual roads are. The earning power of a road like the St. Louis Southwestern is dependent very largely upon the traffic it receives from connections. Seventy percent of its traffic neither originates on nor is destined to any part of its line. Approximately 13 per cent of its revenue is derived from traffic interchange with one line—the Southern Pacific. Imagine the effect on its earnings if this traffic were diverted to another line.

One of the important problems confronting the management of this property is the maintenance of the present flow of interchange traffic along present chan-

* [In this article, and another one which will be published next week, the author emphasizes and illustrates the influence of competition between railways for traffic upon the attitude of railway executive officers toward plans for consolidation.—Editor.]

nels. Recent railroad unifications in its territory have seriously reduced its interchange business. The acquisition of the Vicksburg route (consisting of the Vicksburg, Shreveport & Pacific, and the Alabama & Vicksburg) by the Illinois Central has cost the St. Louis Southwestern the haul from Memphis to Shreveport. The Illinois Central, prior to this acquisition, had no line to Shreveport; and it delivered at Memphis to the St. Louis Southwestern a part of its traffic bound for Shreveport and beyond. With access to Shreveport through acquisition of the Vicksburg route, it carries its traffic all the way to Shreveport over its own line—circuitous as this may be in contrast with the direct route of the St. Louis Southwestern.

The acquisition of the Texas & Pacific, and the International Great Northern by the Missouri Pacific promises to reduce the traffic interchanged between the first two carriers and the St. Louis Southwestern. The traffic manager of the latter has publicly stated "that if the consolidation (referring to the Missouri Pacific System) is as strong as it has been, and we expect it will be, they will succeed in turning at least 50 per cent of the traffic we now receive to their direct connection."

The prospective union of corporate interests based upon existing interlocking directorates of the Chicago, Rock Island & Pacific, and the St. Louis-San Francisco threatens the St. Louis Southwestern traffic interchange at another point. The Rock Island in recent years has delivered considerable traffic to the St. Louis Southwestern at Brinkley and Fordyce, Arkansas. The northbound movement of this traffic is controlled by the Rock Island, and it is within its power to throw it to the lines of the St. Louis-San Francisco at Memphis.

The forces controlling these traffic diversions, which will be explained later, are thus eating away at the foundation of the St. Louis Southwestern's earning power. If it were to depend for its prosperity upon the carriage of traffic it originates on its own lines, it could not exist. It must bend every effort to obtain a fair share of traffic from other lines. Under such circumstances, consolidation with other lines controlling the movement of a large volume of traffic seems to be the only solution. As will be shown later on, however, this by no means follows.

Alternative Routes Between Traffic Centers

Between important centers of traffic scores of alternative routes exist. From Lynchburg to Pittsburgh the shipper may choose from twenty-three open routes; from Pittsburgh to New York from eighteen; from Norfolk to Pittsburgh from twenty-nine; from Newport News to Pittsburgh from fourteen; from Roanoke to Pittsburgh from twenty. A recent computation indicated the existence of three hundred ninety-five short line routes between Virginia cities and Virginia basing points, on one hand, and sixty-six points in New England, Eastern Trunk line, and the eastern part of C.F.A. territory on the other. The shipper can ship over either. Some routes are long, and some are short. Some are direct, and some circuitous. But the choice of the shipper, seemingly, is predicated on none of these considerations. The short and direct route may be a line of light traffic density, while the roundabout line may carry large amounts of freight.

This is not all of the paradox. The through routes over which traffic moves are constantly changing. Existing routes dry up. Others are established. Some routes suddenly enjoy an increasing volume of traffic; while others lose a large amount. A small road like the Mississippi Central may have never participated in any appreciable way in the carriage of freight between Shreveport, La., and Mobile, Ala. With surprising celerity, this little property, which forms part of a circuitous route between these points, captures a substantial volume of this business.

Yet beneath these fluctuating waves of the ebb and flow of interchange business, the preponderant number of through routes continue to carry an increasing volume of traffic from year to year. In many sections of the country combinations of carriers have transported traffic so long between selected points that they are considered to have formed "channels of trade and commerce."

And like so many other economic phenomena, long possession has given rise to assertion of exclusive "vested rights". Shippers have used these routes for many years. Their business has been built around these roads. They have provided industrial sidings connecting with the road's tracks. They have obtained special privileges—milling in transit, fabrication in transit, reconsignment, etc. To break up these routes would disturb many commercial arrangements. Entire communities may have been built up through the interchange effected at a particular junction. Should the traffic be diverted from the present channel, and transferred to a new combination, the traffic flowing through the former point of interchange would be greatly reduced. A community may be impoverished as a result.

The present law on railroad consolidation recognizes the force of this factor. Union of railroad properties may be approved by the Interstate Commerce Commission upon the condition, among others, that the existing channels of trade be maintained wherever practicable. The Commission has taken this clause very seriously. In each unification case, it has carefully examined the existing trade channels via particular railroad lines. It has refused to permit the St. Louis-San Francisco to acquire stock control of the International Great Northern, because such an arrangement promised to upset a long established flow of traffic between the latter and the Missouri Pacific; and it denied the Norfolk & Western permission to acquire the Virginian Railway because of the probability that the former might discourage the continued use of a through route of the latter. The lengths to which the regulatory body has gone in its efforts to maintain the existing channels of traffic has proved to be one of the most surprising results of governmental supervision of railroad consolidation.

How Are Channels of Commerce Established?

The inquiring observer may well ask, how are these through routes forming existing channels of commerce established? Do the shippers, by voluntary action, route their freight over particular lines; and do the carriers thus have nothing to do with the routing? The law supports this presumption; for it gives the shipper the legal privilege to route his freight; and compels the road to follow the shipper's instructions. Yet a moment's thought will show how untenable is the thesis that the shipper exercises universal power over routing from point of origin to point of destination. How can a farmer in Kansas delivering his wheat to the Union Pacific decide that it is to his interest that at Omaha the wheat should be transferred to the Chicago Great Western or to the Chicago, Milwaukee, & St. Paul & Pacific of the seven roads that connect at that point? Is it reasonable to assume that a cotton grower located on the Vicksburg route will be able to decide that in his own interest it is wise to ship a carload to Chicago via the Vicksburg, Shreveport & Pacific to Meridian, Mississippi; Gulf, Mobile & Northern to Jackson, Tennessee; Nashville, Chattanooga & St. Louis to Paducah, Kentucky; and Chicago, Burlington & Quincy to Chicago? Such through routes composed of three,

four or five roads are not uncommon; they may be found in every section of the country. Yet, it is the height of improbability that the average merchant, jobber or small manufacturer will stipulate the exact roads over which his business must move to destination. It has been authoritatively stated that, as a rough guess "about 90 per cent of the shipments tendered by shippers do not show intermediate routes or junction points".

The large industrial corporations do exercise control over the routing of their traffic. They possess highly-organized traffic departments in charge of traffic managers. These are in many cases graduates from railroad traffic departments. They are familiar with routes, rates and services; and they can, therefore, determine the routing of their traffic. With uniform rates they forward the business over the route affording the best service. But, as is more fully developed hereafter, their power is more nominal than real, i. e., from the standpoint of the influence of railroad consolidations upon traffic movements. If a union of railroad interests contributes to the rendition of a better standard of service over its route than that afforded by any other existing route, then the former captures the available traffic. Just that, in short, is the ultimate result and effect of every well planned consolidation.

It may be asked, therefore, whether the roads by agreement among themselves decide the issue? Of course, agreement among particular lines implies disagreement with other lines. But why are those roads included which are included, and those excluded which are excluded?

Consideration of these factors touches the heart and centre of the railroad problem—as a *private business enterprise*. And after all laws are passed, and the regulatory commissions have done their duty, and after the courts have had their say, it is still true that the railroad business is financed by private capital, officered by private officers and managed by railroad men. Politicians and bureaucrats do not operate American railroads.

Underlying the complex movements of traffic over the multitudinous railroad routes is a general law of universal application which is the gospel of every railroad man. The long haul—the desire to retain a shipment on the lines of a road for the maximum distance—is the sina que non of traffic efficiency. For as the haul increases, so the revenue increases. To be short-hauled, to be required to deliver freight to a connecting line at a junction short of that point at which the delivering line can obtain the maximum haul for its line, is to be avoided at almost all costs.

Strong and profitable systems have been those which have been able to obtain long haul traffic and our weak systems have been those which have been limited to short haul traffic. And another traffic official in discussing a specific case, referring to the improbability of a road preferring a 400 mile to a 1000 mile haul stated: "They (it) might do that from a Biblical standpoint, but not from an everyday business standpoint. They (it) don't do it."

This law of the long haul, universal and far-reaching as it is, gives way at times to the force of the law of competition—that all pervading principle from whose effects no so-called public utility monopoly is exempt. A road may surrender its right to the long haul on the business it originates, if thereby it can obtain a larger volume of traffic which originates on another line, and a road may even be obliged to short haul itself to compete on an equal basis with other carriers, and to render shippers in its territory the service they require. Except for such powerful competitive factors, however, the principle of the long haul holds as a driving influence in directing the flow of traffic.

But it may be asked, is not this merely a statement of the wish of the road? A railroad may desire to carry a shipment to the end of its line. But does it possess the power to do so? The law gives the shipper the right to designate the road over which his freight is to move. The railroad must honor his instructions, even if they require a carrier to deliver the shipment to another carrier at a point short of the longest possible haul which the first carrier can obtain.

Despite this apparently insuperable obstacle, the road which originates traffic successfully retains the long haul for its own line. In establishing through routes with the other lines, the originating line, except in the presence of competitive factors, never short hauls itself. The binding force of this tendency has been recognized by a provision in the Interstate Commerce Act. This stipulates that a road in establishing through routes shall not be required to include therein substantially less than its entire line unless the route so established be unreasonably long as compared with another practicable route. That railroads can and do control the routing of a substantial percentage of traffic originating on their lines is one of the most interesting phases of the competitive struggle among American railroads. And it is from this point of view that the problem of railroad consolidation must be examined, if one is to understand the vital forces underlying the movement. Through the operation of factors now to be examined, the acquiring road can divert the movement of the traffic of the acquired road over its own lines. Through consolidation it increases its own traffic. Railroads consolidate primarily not to install the economies that have been so widely advertised; nor to reduce freight rates and passenger fares, as is fondly believed by many. Railroads unite in order to capture a larger share of traffic, and thus increase their earnings.

* * * *

On the Harlem Division of the New York Central Near White Plains, N. Y.

The Bridge is a Masterpiece of Structural Design and Possesses Extraordinary Beauty.

Eads Bridge Pronounced Safe

Investigation of historic structure proves that alleged inadequacy for present loading is unfounded

THAT the justly famous Eads bridge over the Mississippi River at St. Louis is entirely safe for the railway and highway loading to which it is now subjected and that, with the exception of a few minor members, the structure is in an excellent state of preservation, are the conclusions reached in a report of a committee of chief engineers, made on April 23 to Henry Miller, president of the Terminal Railroad Association of St. Louis. The report is based on the findings of John N. Ostrom and J. M. Johnson, consulting engineers who had been retained for extended investigations, Mr. Ostrom to make a detailed inspection of the entire structure and Mr. Johnson to carry out a complete stress analysis on the basis of the maximum live loading possible under the traffic which the bridge is now carrying.

This investigation was brought into being by the furor created in St. Louis following the dissemination of a monograph published by Carl Gayler "who is probably the last survivor" of those engineers who assisted in the building of the bridge between 1867 and 1874. This cast grave doubt on the safety of the structure, pointing to the fact that the live load assumed in the design was only 2,000 lb. per ft. of each track, and 2,000 lb. per ft. of the upper or highway deck, with no allowance for impact, and that "few, if any, railroad bridges built before or even sometime after the time of Captain Eads, are now standing today with the exception of the Eads bridge." It also implied that the steel in the arches, which was rolled at a time when steel manufacture for structural purposes was in its infancy, had been weakened by over-stress and pictured failure of the structure in the following graphic terms:

"Nor should we forget that when the day of disaster arrives, not one span will fall, but on account of the continuity of the bridge, all three arch spans will crash down in a common ruin."

The monograph closed with the proposal that railway traffic be removed from the bridge to the end that the structure be preserved as a worthy monument to the builder.

Bridge Was Examined Critically

The investigation made by Mr. Ostrom embraced a personal inspection of the structure, covering all parts in the greatest of detail. This disclosed defects in certain members and connections in the lateral and sway bracing which call for prompt attention, but showed the tubes and web members of the arches as well as the spandrel members to be in excellent condition. Of particular note is the good condition of paint surfaces and absence of corrosion on any of the main members.

Analysis of Steel Borings Taken From Tube Staves

Carbon	Manganese	Silicon	Sulphur	Phosphorus	Chromium
0.75	0.10	0.105	0.006	0.039	0.64
0.64	0.096	0.138	0.009	0.062	0.63
0.94	0.20	0.112	0.010	0.033	0.54
0.76	0.05	0.056	0.006	0.050	0.62
0.95	0.041	0.118	0.007	0.050	0.68
0.85	0.096	0.075	0.007	0.052	0.62
0.88	0.095	0.19	0.010	0.038	0.64
0.67	0.18	0.108	0.011	0.053	0.59
0.75	0.087	0.095	0.007	0.029	0.62
0.76	0.23	0.094	0.011	0.039	0.57
0.89	0.018	0.065	0.010	0.007	0.61
0.69	0.15	0.090	0.013	0.057	0.58

In addition to the surface examination, 12 holes 1 in. in diameter were drilled in selected locations through the chromium steel staves of the arch tubes for the dual purpose of securing borings for chemical analysis and to permit examination of the interior of the tubes. The table shows the findings of this analysis. While it is impossible to arrive at any definite conclusion with respect to the physical properties of the steel possessing the chemical composition shown, the analysis serves to support the historic data on the results of physical tests made upon the metal used in the arch tubes.

Examination of the interior of the tubes with the aid of a small searchlight passed through the drilled holes, disclosed some variations in the appearance of the interior surface. In some cases, this was of a shiny black

appearance of the asphaltum varnish with which the tubes had been treated. In others this varnish had suffered appreciable disintegration, in some cases to a powdered form, or had peeled off the surface of the metal, which presented a blotchy appearance indicating oxidation. However, the interior was dry in all cases, and there was no evidence of scaling or pitting.

An abstract of the report of Mr. Johnson, based upon his analysis of the stresses is given below.

The main bridge consists of three arched spans, the flanking spans being about 502 ft. and the central span about 520 ft. in length between end pins of the upper tubes. The bridge carries two railroad tracks and a roadway above for vehicular and street car traffic. Transversely, the ribs are 16 ft. 6 in., 12 ft. and 16 ft. 6 in., center to center. Vertically, the tubes are 12 ft. center to center and are parallel. The central span being the longest, was considered in this investigation. The arches are segments of circles, the upper tube having a radius of 742 ft. and the lower 730 ft. with a rise of 47,044 ft.

The heaviest continuous train load operated over the bridge is a train of oil cars weighing 4,000 lb. per lin. ft. of track. Eighty-ton gondola cars weigh between 3,800 and 3,900 lb. while 80-ton hopper cars weigh about 4,400 lb. per ft. It seems to be the usual switching practice, in handling cars somewhat heavier than oil cars, to couple them to lighter cars, thereby keeping the weight per foot not more than 4,000 lb. per ft. but usually considerably less. The load per ft. of 5,000 lb. per ft. of track or 10,000 lb. per ft. of bridge was assumed for use in this analysis. This load per ft. assigns 2,000 lb. per lin. ft. to the highway as live load, and also assumes that the highway load moves in unison with the train load—a manifestly improbable occurrence. For a span as long as 520 ft. the highway live load would rarely, if ever, reach 2,000 lb. per ft. for the entire bridge.

The switch engine operated over the bridge has a panel concentration of 68,000 lb. for one rib. This excess could not be ignored, the load of 68,000 lb. being preceded and followed by panel concentrations of 29,550 lb., equivalent to a uniform load of 2,500 lb. per lin. ft. of rib.

Temperature records since 1874, furnished by the weather bureau at St. Louis, indicate that once in the past half century the thermometer registered as low as 22 deg. below zero. The fact that such a low temperature has occurred justifies the use of plus and minus 80 deg. F., in obtaining the stresses from the effect of temperature. This was the range adopted by the designers. A modulus of elasticity of 27,000,000 also used by the designers, was retained in this investigation.

As each stave was tested to 50,300 lb. per sq. in. in compression at the shop and this stress was known to be below the elastic limit, a unit stress of 50,000 lb. was adopted, with which the actual stresses could be compared. It is not to be understood, however, that 50,000 lb. per sq. in. in compression is recommended as a safe working stress. Working stresses should have a margin of about 10,000 lb. below this unit. A comparison unit stress of 45,000 lb. per sq. in. was used for tensile stress comparison. (Elastic limit between 50,000 and 60,000 lb.) Actual working tensile stresses should be considerably below this unit stress, (about 15,000 lb.).

The diagonal braces were made of the best quality of wrought iron. Wrought iron has been in use for many years and so thoroughly tested that its limitations are well known. Accordingly exact limits can be set for the comparison units to be used. The American Railway Engineering Association, in the Manual for 1921, suggests 22,000 lb. per sq, in. for good wrought iron, as a safe working stress, provided the members are in good condition. This unit was used for comparison with actual stresses.

Results of the Stress Analysis

An inspection of the greatest stresses for the tubes shows that for the lower tube, the maximum compression occurs near the springing line with a unit stress of 39,700 lb. per sq. in. This is the maximum for both tubes and is 10,600 lb. less than the test load on each stave—a safe stress. For this tube, the maximum tension occurs near the crown with a small unit stress (6.9) which is too small to have any special significance except as showing a stress reversal. For the upper tube the maximum compression occurs at the crown with a unit stress of 36,300 lb. The maximum tension occurs at the springing with unit stress of 18,100 lb., which is likewise as a safe stress.

The greatest temperature effect occurs so seldom, possibly at about 50-year intervals, that temperature stresses can be omitted in the consideration of stress reversals. Likewise the wind; a 30-lb. wind is no zephyr as it will overturn an empty box car 40 ft. long weighing 40,000 lb. and presenting 10 sq. ft. of surface per lin. ft. to the wind. A wind of this intensity occurs but seldom. The live load, however, produces stress reversals in certain members during the passage of a regular train. The unit stresses however, are so small, and the time required so long to produce any perceptible diminution in strength, that this matter might well be left to the attention of some future generation.

The greatest tensile unit stress found in a web member amounts to 18,600 lb., the corresponding stress in compression being 7,600 lb. The greatest compressive unit stress is 17,700 lb. with a tensile unit stress of 7,000 lb. The unit stress in compression, 17,700 lb., is practically the proof strength. It must be noted however, that this stress was obtained, not from the actual gross area, but from the area of the side bars alone, not including the T-bars forming a part of the members.

The unit stress due to maximum temperature, amounting to 3,900 lb., is included in the 17,700 lb. This addition is not likely to occur except at long intervals. With this explanation of the seemingly high stress, it is believed that all braces having tabulated stresses over 16,000 lb. per sq. in. are amply safe. The designers used the area of side bars only in computing the gross section, evidently considering the area of the T-bars as "good measure." With the additional dead load (which adds to the stability) and the thrust obtained by this analysis being somewhat less than that found by Professor Howe in 1902, the writer agrees with his conclusion that the piers are amply safe. The piers were assumed to receive no support from the soil.

Conclusion

In the opinion of the writer the arched ribs and the piers of the Eads bridge have stresses well within safe limits under the weights of equipment now being operated over the bridge and at the speed of about 15 m.p.h., used for tonnage trains. It is noted also that the greatest stresses obtained have been computed for the worst combinations, and further that under the every day working conditions the stresses would be considerably reduced.

The committee of chief engineers who signed the report consisted of E. A. Hadley, Missouri Pacific, (chairman); R. H. Howard, Wabash; F. G. Jonah, St. Louis-San Francisco; H. J. Pfeifer, Terminal Railroad Association of St. Louis; C. D. Purdon, consulting engineer, St. Louis Southwestern and F. Ringer, Missouri-Kansas-Texas.

Executives Pay Tribute to R. H. Aishton

Daniel Willard makes address presenting gold cup to president of American Railway Association and chairman of Association of Railway Executives

R. H. Aishton, president of the American Railway Association and chairman of the executive committee of the Association of Railway Executives, was presented with a gold cup, at a dinner given by members of the executive committee of the Association of Railway Executives at Atlantic City on June 14, in recognition of the fiftieth anniversary of his continuous railroad service and his sixty-eighth birthday on June 2.

The cup bears an inscription referring to the anniversary, and stating that it was given "by his friends and associates on the executive committee of the Association of Railway Executives as a token of their confidence, affection and esteem."

The presentation was made by Daniel Willard, president of the Baltimore & Ohio, who said in part:

"My associates on the executive committee have imposed upon me a very pleasant duty, but they did not inform me as fully as I might have wished concerning the inspiring motive of the act.

"Of course, I realize that you were a railroad president, but I hardly venture to say in this gathering of railroad presidents that you were the greatest railroad president. I probably could not get unanimous support for that thought if I should advance it, but they all will agree with me that you were a good railroad president. But even that would not be a sufficient motive for what I have in mind. I tried to think, in order that I might explain the matter to you more fully, just what was the cause behind this action, and inasmuch as Colonel Thom did not take pains to tell me just how it happened, I have had to think it out from my own point of view, and what I shall say represents simply the development of my own thought.

"I decided it was not because you were a railroad president that we were doing this, and then I wondered it it was because you were a great orator. Certainly you are not the greatest orator; but I fancy we have noticed improvements in recent years under the influence of our oratorical friend on our right here (Mr. Thom), and I will say that you have improved. Still, you are not the greatest orator, and even in a gathering such as this I do not think an occasion of this sort could be accounted for by the fact that you were an orator.

"I don't know what kind of a game you do play, but from the remarks of some of your friends it was not because of your excellence at golf.

"And then some one suggested that you had a birthday this month, the second of June. But birthdays don't interest me *pro tanto*. As an absolute fact, I am in favor of abolishing birthdays since entering the class of grandfathers. They are all right for grandchildren; but why grandfathers should be reminded of a birthday is more than I can understand; and at any rate, I don't see why you should be entitled to credit because it happened to be in June or because you have any at all.

Fifty Years of Railroad Service

"Now it is also a fact that you did complete fifty years of service with the railroads on the second of June of this year, and I think that is a significant fact, and certainly it will be considered so among any group of railroad men.

"You entered the service of the Northwestern, so I am told, as an axeman. The record does not disclose that you were particularly superior as an axeman, but you managed to hold your job, I suppose, and that was to your credit, and you continued to hold your job. So that it might be said of you that you began at one end of the service and went out by the other and that you accomplished the whole ladder, and that is greatly to your credit and should be an inspiration to other boys who started as you did and with the same incentives ahead of them.

"But still, although you did all that, I am not so sure that that would entitle you to this act that I am going to perform. It so happens that about ten years ago, after forty years serving one company, you then undertook to serve, and have served for the last ten years very well, all of the companies in the United States, as president of the American Railway Association and, more recently, as chairman of the executive committee of the Association of Railway Executives.

A Great Constructive Work

"I happen to know something of the difficulties confronting you as president of the A. R. A. When you first took up those duties it was in the reconstruction days after the war. The position which you filled for the first time needed a man who not only understood railroading in a practical way, but with it all elements of leadership, and among the elements of leadership I am sure one of the most important is that you should have the confidence of those whom you hope to work with. You did have the confidence of your associates. You brought to the position not only a very definite practical understanding of the problems confronting the railroads, but you brought with it also an earned confidence, so that when you took hold of the work and asked the different executives to do things that they had never been asked to do before, and urged them to make sacrifices in the interest of the common good, they did it—rather reluctantly indeed, but after all it was greatly to their credit and to your credit that they did it at all. And in the last five or six years, as the result of your leadership, the Car Service Division and the other agencies that function with the A. R. A. carry on their work so smoothly that, so far as I am concerned, I am not conscious any more that there is any such association and it no longer chafes.

"In my opinion, the forming of that committee and the development of the technique which has been brought about in your administration is one of the greatest and most constructive efforts ever undertaken

by railroad executives in this country, and has done more and will do more than anything else, so I believe, to conserve private ownership. That is how I feel about what you have done as the head of the A. R. A. and the Association of Railway Executives.

"What I have said was sufficient to have inspired me to want to do the thing that my other associates on this committee have wanted to do; and whether I have explained to you the motives that Colonel Thom had in mind or not, I cannot say, but I do say that the motives that I have referred to are amply sufficient and more than justify the action.

"Mr. Aishton, your friends the members of this association have caused to be prepared this cup, suitably inscribed, which they have asked me to present to you with a few words this evening. They were particular to emphasize that word 'few,' and I am almost done. You are not to regard it, you certainly will not regard it, from the point of any intrinsic value, but it is hoped that it will serve as a constant reminder to you of the esteem and the regard of your associates on this committee, and I am sure I am not going too far when I say we hope it will be a perpetual reminder to you of our affection."

Mr. Aishton's Response

Mr. Aishton, who was completely surprised, replied:

"Mr. Willard and gentlemen, I don't know what to say. You have knocked me speechless. It is what the cup symbolizes that means everything to me. You know, there are some things that mean the most of all in this world. Wealth means something, of course; power means something; authority means something. But when a man can spend fifty years with a bunch of railroad men and at the end of that fifty years gets such a wonderful token of their friendship and esteem, it is well worth while, and I do appreciate it most sincerely.

"I have enjoyed my fifty years of railroad life. I can truly say that during that period, while I have had my trials and my tribulations, there has never been a moment that I have not had the greatest happiness in that work; and of all the time I have spent in that service, the association with you gentlemen in this Association work has been the most satisfactory and the most gratifying of all the years I have spent in the railroad service. I want to thank you gentlemen for the support you have always given us. If we have been instrumental in helping to carry out your policies and make them successful, it makes Colonel Thom, myself and all our associates very happy indeed, and on behalf of them I want to thank you again for this token of esteem to your chairman.

"Now, Colonel Thom, in my association with him the last eight years, has been the most wonderful inspiration in every way, except in oratory. Again I want to say that I do thank you—not for the cup, which I shall treasure all my life, but for what it symbolizes."

Hearing on Accounting Rules

Railway officers ask Commission to decide underlying principles

WASHINGTON, D. C.

THE hearing on the proposed general revision of the Interstate Commerce Commission's accounting rules for steam railroads, before Commissioner Eastman and Examiner Bunten, was resumed on June 14. After two days devoted to cross-examination of witnesses who had testified at the earlier hearings, Edward Wray, publisher of "Railway Purchases and Stores", and J. W. Roberts, president of the Roberts-Pettijohn-Wood Corporation, the presentation of testimony on behalf of the railroads as to the principles which should govern any revision of the classifications was begun. F. J. Fell, Jr., comptroller of the Pennsylvania, gave a statement in rebuttal of testimony by Mr. Roberts in which he had advocated an "alternative plan" of accounting, designed to serve some of the purposes of "cost accounting".

J. J. Ekin, comptroller of the Baltimore & Ohio, and chairman of the committee of the Railway Accounting Officers Association co-operating with the Interstate Commerce Commission in the matter of the revision of the accounting rules, presented a general statement saying that the presentation on behalf of the railroads would be limited to certain general principles on the assumption that, as the result of the hearing and the hearing on depreciation, the commission will decide the principles to underlie its revised accounting classifications, and that the commission's representatives will then prepare tentative revised classifications embodying those principles, which will be submitted to the accounting officers' association for review and co-operative conference with the commission's representatives, before the classifications are issued in final form. He said that such a subject could hardly be adequately discussed and conclusively disposed of under the conditions inherent in a public hearing, without prolonging the hearing unduly and without consuming the time of the commission unnecessarily.

An abstract of the general statement by J. J. Ekin follows:

Accounting System Developed by Railroads

The systems of accounts and statistics were originated, developed, and made effective by the railroads and were the result of many years of thought and practice in actually handling one of the greatest and most essential industries in the world. It was no haphazard scheme, but a well thought out plan of accounting which was accepted and adopted by the commission and made effective under the regulatory power conferred upon that body.

There is no industry which has been subjected to the same scrutiny and criticism as the railroad industry, and the accounts have stood the test as evidenced by annual and other reports of the Interstate Commerce Commission itself. It has been necessary to make them meet every situation, including the incessant demands of regulation.

There is probably a greater variety of so-called cost finding in railroad work than in any other industry for very good and sufficient reasons, among which may be mentioned the very conditions under which the great variety of services are performed, and for the reason that there is probably no other industry with as great a turnover compared to the net profits as the railroads, i.e., the margin between receipts and expenditures is very thin.

Railway accounting has been, and will continue to be responsive to the needs and requirements of the railroad management and the Interstate Commerce Commission. Like every other profession, railway accounting is developed within the

profession, although welcoming and encouraging suggestions from outside sources, but eventually the judgment of the profession itself must be depended upon for determining the practical and worthwhile qualities, if any, of such suggestions. Railway accounting cannot be subject to domination or control by those whose results are subject to accountability.

There is no mystery to railroad accounting. The distinguishing characteristics of railway accounts is that they are based on simple, fundamental and controlling factors, being mirrors to reflect the payment for energy expended as represented by the payrolls—purchase of man-power; payment for materials and land entering into the construction, maintenance and operation of the properties; payment for fuel with which to generate power with which to operate the trains, be it steam, electricity, water power, or any other form of power; payment for the casualties that occur in conducting a business embracing the hazards of transportation; payment for supervision, which, of course, is part of the payroll, but represents the cost of managing the properties in an efficient and economical manner. On the other hand the accounts also reflect the revenues collected under rates prescribed for transportation of persons and commodities as well as the financial accounts which follow as a result of ownership or operation of the properties.

Possessed of information regarding the payroll, the material, the fuel, etc., together with related statistics, the railroad managements, speaking generally, have the data necessary for railroad operations and for expense control. Practical railroad management concerns itself with to-day, to-morrow, and the near future, rather than yesterday and the distant past.

In approaching this problem this thought—the utility, the purpose to be served, should always be given precedence. The first, and most important, thing is—does the management need these figures, these allocations by accounts, these statistics, in maintaining, operating and managing the properties in an efficient and economical manner? That is the first thing that should be given consideration, and that is why I have always advocated a simple classification with as few accounts as possible so far as uniform reporting is concerned to federal, state, or other bodies, leaving with the carriers, under the proper policing of the commission, the breaking down, the separation of these accounts, as they may find it necessary in meeting the particular and peculiar requirements of the given properties for which the accounts are kept.

The second thing that should be given consideration is the requirements of regulation; what should be furnished the regulatory bodies.

I am glad that we have this hearing so that light may be thrown upon this subject and so that responsibility may be placed where it belongs. I again repeat we should indicate what is necessary for the management of the properties and then we should determine what, in addition, is necessary for the regulatory bodies; what does the commission require in addition to what the carriers need? This should be approached in the broadest spirit of cooperation, for the purpose of getting a simple, clear and concise statement of the accounts with the least expenditure and still serve the public in an efficient manner. Really the interests of the carriers and the commission are mutual in this respect.

It is recognized that the Interstate Commerce Commission, with its duties and responsibilities under the law must obtain and have available, accounting data, indicative of what has transpired on the various railroads, reported to the commission, in a uniform manner. The regulations of the Interstate Commerce Commission make obligatory on all carriers a uniform accounting system which is, in the interest of economy, used by the carriers themselves wherever possible, and to which they endeavor to adapt their inherently varying requirements.

If the needs and requirements of the railroad management are the determining factor in the revision of the accounting classifications of the Interstate Commerce Commission, those classifications could be materially simplified. If the needs and requirements of the Interstate Commerce Commission in the administration of its duties and responsibilities, and acting in the public interest, are the paramount or controlling factor in the accounting classifications, it is obvious that the first step in any revision should be for the commission to clearly and explicitly state its requirements.

Simplification Urged by Railways

Our position was outlined in a letter addressed to Mr. Wylie, under date of April 4, 1922, in which was indicated the earnest wish and desire of the association to cooperate in this work. In this letter the opinion was expressed that it was not a refinement and further expansion of the classifications that was desired but a reduction in the requirements. The fact was mentioned that the nearer we can have the disbursement accounts reflect the current expenditures for labor—payrolls—fuel, materials and supplies, the more useful the accounts will become as a check and record of these items of cost, and it was strongly urged that the revised classifications should show separately with as few accounts as possible the direct items of expense for labor, fuel, and materials and supplies, the aggregate of which constitutes the cost of maintaining and operating the railroad properties.

The Railway Accounting Officers Association on behalf of railroad managements desires to cooperate to the fullest extent possible with the Interstate Commerce Commission in this proceeding, recognizing that the submission of constructive suggestions is a public duty.

We trust, however, it will not be regarded as improper to mention that an involved and technical subject such as the revision of the railroad accounting rules could hardly be adequately discussed and conclusively disposed of under the conditions inherent in a public hearing, without prolonging the hearing unduly and without consuming the time of the Commission unnecessarily.

Therefore, our presentation will be limited to certain general principles on the assumption that as the result of this hearing and the hearing on depreciation the commission will decide the principles to underlie its revised railroad accounting classifications, and that the commission's representatives will then prepare tentative revised classifications embodying those principles, which tentative classifications will be submitted to the Railway Accounting Officers Association for review and co-operative conference with the Interstate Commerce Commission's representatives, before the classifications are issued in final form.

My testimony relates to the subject in general. There will appear after me a witness on the Road and Equipment Classification, another witness on the Operating Revenue Classification, another witness on the Operating Expense Classification, and a witness has already dealt with the alternative plan and so-called cost accounting presented by Mr. Roberts, representing the National Industrial Traffic League. It is contemplated that the presentation mentioned will constitute the evidence to be offered by the railroads.

Investment in Road and Equipment

Early in 1926 the Bureau of Accounts of the Interstate Commerce Commission prepared a tentative revised classification of Investment in Road and Equipment of Steam Roads, which was made the basis of cooperative review with the Railway Accounting Officers Association. The Railway Accounting Officers Association through its Committee on General Accounts, being desirous of assisting the Commission and recognizing changed conditions and need of simplified investment accounting, prepared a classification for Investment in Road and Equipment—

(a) simple in its application
(b) direct in result
(c) using records already mandatory under the commission's Valuation Order No. 3
(d) and embodying the principle of entire projects rather than component parts.

This proposed classification with letter from the president of the Railway Accounting Officers Association was submitted to the Commission's Bureau of Accounts in May, 1926.

At this point in connection with accounting for investment, I would like, if I may, to call attention to a problem which concerns both the carriers and the commission. I refer to the valuation work, including reports under Valuation Order No. 3, the accounting for investment, the preparation of detailed reports of investment and improvements submitted to the commission when authorizing the issue of securities, and the allied question of depreciation and recapture—all of which have to be considered in connection with the Transportation Act of 1920. Every effort should be made, both by the carriers and the commission, in coordinating this work so as to avoid confusion and prevent expensive duplication of work.

The Bureau of Accounts prepared a tentative revised classification of operating revenues, which was reviewed by the railway accounting officers in cooperation with representatives of the commission.

A witness will explain the suggestions that the Railway Accounting Officers Association has to make, i.e.,

(a) Filing exhibits with the Interstate Commerce Commission, indicating the particulars of the Carriers' plans of revenue accruals.
(b) Our recommendation that the proposed account 131—Heating and Refrigeration—be eliminated from the tentative revised classifications of operating revenues.

Related to revenue accounting and statistics is the recent requirement of the commission, effective January 1, 1928, providing for stating freight revenue for the prescribed 157 commodity classes.

There was prepared by the Bureau of Accounts a tentative revised classification of operating expenses, which was reviewed by representatives of the Railway Accounting Officers Association in cooperation with representatives of the commission. Another witness will present testimony on the changes suggested by the Railway Accounting Officers Association, explaining the reasons for our suggested modifications. The major items are:

(a) The creation of a primary account for the inclusion of all charges incident to work train expenses.
(b) The inauguration of a primary account for the inclusion of all charges incident to shop expenses.
(c) The establishment of a primary account for the inclusion of all charges incident to material store expenses and stationery store expenses.
(d) It is recommended that a new general account be created styled "Miscellaneous" under which would be included primary accounts as follows:
(1) Valuation Expenses
(2) Pension and Relief
(3) Casualties Account
(4) Material Store Expenses
(e) The consolidation of some primary accounts is suggested.

We must not forget that accounting regulations and requirements enter into the minutest details of railroad operations; into the timekeeper's work, the material clerk's work, the agent's work—both ticket and freight. It is for these reasons that I support a classification of receipts and expenditures as simple, direct, and concise as can be made, relating the accounts so far as possible to the physical facts—payroll, material, fuel and casualty accounts. If this is done, the physical and other statistics will naturally coordinate with the accounts, reflecting in a direct manner the facts developed relating to the operation and maintenance of the property.

The tentative revised classifications of Income, Profit and Loss, and Balance Sheet accounts were prepared by the Bureau of Accounts, but review has been deferred awaiting the establishment of definite principles in the modification of the accounting rules involved in road and equipment, operating revenues, and operating expenses, that would naturally affect the provisions to be made in the rules covering Income, Profit and Loss, and Balance Sheet accounts.

J. W. Roberts, who had presented on behalf of the National Industrial Traffic League an elaborate "alternative plan" of railway accounting classification, designed to serve some of the purposes of cost accounting, was cross-examined at length by W. S. Bronson, counsel for the railways, and by representatives of the commission. His plan, which was briefly outlined in the *Railway Age* of November 19, 1927, provides for a system of primary accounts, subdivided further into line-haul, station and train-terminal accounts, and for the apportionment of expenses to freight service and eight passenger service accounts. An exhibit introduced by Mr. Roberts also set up various bases of apportionment of common expenses to the various accounts and after a good deal of cross-examination as to these bases Mr. Roberts and R. C. Fulbright, chairman of a committee of the National Industrial Traffic League, said that the specific bases were not being recommended by the league but were tentative suggestions for illustrative purposes. Mr. Bronson then discontinued his cross-examination as to the bases of apportionment but on the following day Mr. Fulbright said he withdrew Mr. Roberts' statement which had been made on cross-examination and had him correct his previous statement to say that the bases were the recommendations of the league "unless something better is offered." This led to considerable argument as to the exact status of the matter.

After a discussion on June 14 of the speed-gross-ton-mile basis for apportioning maintenance expenses, including the question as to whether such a basis would not tend to increase the porportion of maintenance expenses assigned to passenger service instead of to freight service, Mr. Bronson had asked Mr. Roberts if it was to be understood that the prime purpose of his plan "is to bring to light expenses for the three so-called functional operations and eventually exhibit these expenses in one freight and eight passenger train service accounts through the use of the bases suggested in your exhibit B?"

"No, sir," replied the witness. "I have said these bases of apportionment and distribution were put on this exhibit No. 2 for strictly illustrative purposes. They may be the correct bases or they may not be the correct bases. It remains to be determined."

"Are they your recommendations?"

"They are not our recommendations. No, sir. They are put there for illustrative purposes only."

However, when Mr. Fulbright took up the re-direct examination, he asked Mr. Roberts if he had any correction to make to his answer.

"That answer was not exactly the correct one," said Mr. Roberts, "because we do recommend the partitioning of these expenses to the service costs, and the only thing that we fail to recommend is rigid adherence to the bases of apportionment that we have used here for illustrative purposes."

Mr. Fulbright asked Mr. Roberts if it is possible for shippers to obtain from the various information filed by the carriers under the present accounting system the cost to the carriers for performing services relating to a particular commodity or particular branch of the service. Mr. Roberts replied that it is not possible for the reason that the accounts have not been designed with the idea of giving that information but that under his proposed plan a group of shippers interested in knowing whether the rates they paid for freight service were compensatory could take the revenue derived from freight service as it would be classified under the system of revenue accounts and the total charges against freight service as evidenced by the operating expense statement and compare the two and "determine what they wanted to know. If they wanted to break that down into individual commodities they would have to go into research but they would be able to determine that and also for the other services."

Mr. Roberts also said in cross-examination that his plan would not directly reveal manufacturing costs of articles made by railways for their own use.

Mr. Roberts also was questioned by Commissioner Eastman, M. O. Lorenz, director of the commission's Bureau of Statistics, and F. A. Barnes, assistant director of the Bureau of Accounts. Commissioner Eastman asked him to tell just what information he thought would be produced by his system without further cost studies, which would be valuable for the purposes of management or for the purpose of regulation of rates. Mr. Roberts said it is fundamental that the information developed through it or any other system of accounts would have to be amplified by some further detailed consideration which habitually it would not pay to bring into the final statement of accounts. He said that railroad people have not become accustomed to dealing with cost information but that if they were furnished fairly dependable costs, upon which they could rely, they would in time come to rely upon costs and use them in lieu of performance statistics.

In reply to Dr. Lorenz, Mr. Roberts said that the intent of the plan was that it would be necessary to make a specific study if it was desired to know the cost of carrying livestock between Chicago and New York, for example.

Mr. Barnes asked if some plan should not be adopted for a demonstration, perhaps of a single railroad, of the correctness of the rules proposed "before the waste or without the waste of millions of dollars which would probably result if the scheme failed." Mr. Roberts answered that his judgement was that the plan or some simple modification of it should be prescribed by the commission. Commissioner Eastman remarked that in every change in accounting regulations which the commission has made so far, while it may not have had the entire agreement of the carriers, at least it has had substantial co-operation. "Now supposing we should come to the conclusion that an accounting system along the general lines which you recommend is desirable", he said. "It would then be necessary to work out the specific text of such classifications and also work out all of

these rules for apportioning common accounts, etc. Now, would the commission be safe in working all of these matters out and imposing such a system of accounts upon all of the carriers of the country, failing their co-operation, unless it had an opportunity to put the system to practical test upon at least some one railroad?"

"I would say, Mr. Commissioner," replied Mr. Roberts, "that the safety of such a project would be doubtful and its prudence would be doubtful also. There is not room for any highhandedness in this thing, I think. It is a problem we mutually share and we can mutually work it out if we put our minds to it. By all means that should be done."

Later he gave a more complete answer to the commissioner's question, suggesting that the commission call upon the railroads to submit "constructive suggestions" for working out the details.

Mr. Fell's statement in rebuttal of Mr. Roberts' testimony summarized the objections to his alternative plan as follows:

Comments on the Roberts Plan

A detailed study of the basic provisions of the plan has forced upon our minds certain adverse conclusions to which I will now call specific attention:

1. The "Alternative Plan" will not provide the carriers with a yardstick for measuring economy of operation, irrespective of the claim made in the plan.

2. It provides that basic data, voluminous and unwieldy, be currently compiled even though seldom required, and, at the same time, such data would be insufficient insofar as eliminating special field investigations is concerned.

3. It will tend to abnormally increase the number of accounting errors possible, by reason of the extensive accounting ramifications prescribed through the creation of additional primary, sub-primary, and cost service accounts, with the resultant increased multiplicity of labor and material distributions, which will require a considerably higher grade of men at larger salaries and greater supervision.

4. It does not, as a gencal rule, provide the necessary bases for making apportionments to the primary accounts under the three functional accounts when combination service is involved.

5. It suggests that a scientific study be made of a representative number of cars, of each kind, on a number of representative carriers, for which should be kept a history of repair expenses, their causes and the responsibility thereof. The proposed study to serve as a basis for determining the constructive car-miles per day for station and train terminal car-days.

Such a study as proposed would necessitate recording the history of thousands of cars used in the three functional services; the test period would have to cover sufficient time to be representative; the study, when completed, would be representative for only the particular cars under review, for the particular carrier investigated, and for only the particular test period selected; the necessary costs would be stupendous and would be upset if any individual carrier resorted to increased or decreased elimination of prior classifications of cars, thus affecting intermediate switching after a study of this kind was made, or any other changes of a major nature were made.

6. It would produce only average expenditures by districts for nine cost services. When combined for systems, the results would still be averages and, at the same time, would be predicated principally on arbitrary allocations necessitating prorate after prorate, distributions upon bases, e.g., "Relative consumption or benefit," that would create unending difficulties.

7. It will not produce actual costs of commodity transport, even by groups.

8. It cannot be accepted, or even considered, a cost accounting plan that could, in practice, be applied to the railroad industry for the reason that it is replete with both arbitrary and undefined bases for expense allocations.

9. It destroys the identity of certain expenditures which are now covered by specific primary accounts that are of prime importance, i.e., Maintenance of Way-roadway buildings, shop structures, power plant buildings, etc.

10. Its texts refer to the necessity of manufacturing data, but the plan makes no provision whatever to cover this subsidiary activity.

11. It suggests new statistics for the purpose of allocating expenses, many of which had been previously arbitrarily assigned, the compilation of which would require vast clerical energy and expense, e.g., "Speed-gross ton miles," "Allotted car-foot space," "Aggregate car days station detention," "Terminal car days, plus cars dispatched," "Gross-ton transfer miles," etc. etc.

12. It would disarrange and distort, for comparative purposes, the component parts not only of general departmental accounts, but also operating ratios, by such procedures as allocating certain structural maintenance to Transportation Expenses and taxes to expenses. This is not in the public interest.

13. It provides that taxes and rents (including equipment rentals) be distributed to each maintenance primary account, but the bases for making these distributions are not even suggested.

14. It provides that the cost of transporting "company use" material, and employes, be accounted for, however, no suggestions are made for securing basic data or determining costs involved.

15. It will unwarrantably inflate Transportation Expenses account of distributing overhead expenses on the basis of total labor charges only, thereby eliminating all material consumption as an essential distributory base. Material is a vital contributory factor in overhead expenditures and its consumption is almost negligible in Transportation costs as compared with the M. W. S. and M. E. departmental costs.

16. It will seriously interfere with the meeting of mandatory schedules for closing of accounts owing to the multiplicity of interlocking clearing and common accounts.

17. It can ultimately produce only arbitrary results at prohibitive costs which would be wholly unwarranted and of no use.

Mr. Fell also gave in detail his reasons for the conclusions expressed in the summary, in which he was cross-examined at length by Mr. Fulbright and Mr. Roberts.

Accounting for Material Stores

When the hearing was resumed on June 14, Edward Wray, publisher of "Railway Purchases and Stores," who had testified at the hearing on March 28, was cross-examined by Mr. Woodson, and admitted to several corrections in his previous testimony. Mr. Wray had advocated a subdivision of the general balance sheet account (716) Materials and Supplies, in a schedule supporting the general balance sheet, and also that the new primary expense account, Material Store Expense, which he said had been suggested by the commission in connection with its tentative accounting rules, be set up so as to include all material handling expense up to the point of actual application of the material itself.

In reply to questions by J. W. Roberts, Mr. Wray said there had been discussion among railway purchases and stores officers as to the need for further information respecting the contents of the materials and supplies account so as to make possible comparisons one road with another. If the information were given on the balance sheet or through a sub-schedule he presumed it would be the same information as the material stock report but that the material stock report was not contemplated to be mandatory but would be left to the discretion of each individual railroad as to whether it would furnish the information to the secretary of Division 6 or not. He said he felt it would benefit the railroads if comparisons are made possible in respect of materials and supplies in the same way and to the same extent that the railroads are now benefited by comparisons in respect of operating statistics. In reply to Woodson he said he was aware of factors outside of accounting that affect comparability as between carriers on their material stock but that they would have to be considered in the same way they have to be considered now in making any comparison of operating expenses.

Canadian National Opens Station at Edmonton, Alta.

THE CANADIAN NATIONAL recently completed and placed in service a new passenger station at Edmonton, Alta., in which utility is combined with pleasing architectural effects. The structure consists of a two-story main building, 95 ft. by 159 ft., with a one-story baggage wing, 49 ft. by 324 ft., both of reinforced concrete beam and girder construction, faced with brick. The ground floor of the main building is used for station purposes exclusively, while the second floor is given over to the division offices, and the plans are so drawn that an additional story may be added to the entire structure at any time in the future.

Red corduroy brick is used as facing for the main portion of the building above the base course, which is of Tyndal stone up to the level of the window sills of the ground floor. The main entrance is flanked by wide borders of the same stone, surmounted by a heavy stone lintel. Doric columns on each side of the entrance support an entablature extending across the projecting front of the building at the top of the second story, and stone belting courses are carried around the other walls at the top and bottom of the entablature. Numerous windows supply natural light to both floors of the building, the windows and transoms in the central poriton of the front elevation being fitted with bronze sash in the form of a Greek cross. The building is covered with a five-ply felt, tar and gravel roofing, insulated with 2½-in. Insulex, which is also used as a deadener under the floors of the second story of the main building.

The long axis of the building is approximately at right angles to the tracks, which lie to the north of the station. The waiting room, 34 ft. wide by 90 ft. long, occupies the center portion of the ground floor and extends the full height of the two stories, skylights above this space providing both natural light and ventilation.

A concrete balustrade, with panels cast in the form of Greek crosses, forms a guard for the balcony on the second floor which overlooks the waiting room and from which access is gained to the division offices. The various facilities, such as the ticket office, news stand, dining and lunch rooms, etc., are located along the sides and ends of the waiting room in such a way as to be easy of access without encroaching on the waiting room space.

Entering the building, the men's room and lavatories are situated in the southwest corner of the building, with an entrance opening from the corridor leading to the waiting room, while the women's rooms are similarly located in the southeast corner of the building. The ticket office and news stands are located on the west side of the building and a row of columns, which defines the west side of the waiting room, forms the east side of a corridor in front of these facilities, which keeps patrons transacting business at these points entirely out of the waiting room.

The Design Combines Utility and Pleasing Effects

Dining Facilities

The dining room and lunch counter are located on the east side of the building, adjacent to the waiting room, from which they are separated by a partition composed largely of windows and a door. The kitchen is situated to the north of the lunch room and is divided

The Ticket Office and Other Facilities Do Not Encroach on the Waiting Room Space

from the waiting room by a solid partition, entrance to the kitchen being provided by an outside door in the west wall. The lunch counter, which is a departure from the ordinary type with high stools, is 2 ft. 7 in. high, or the height of an ordinary dining table, and is equipped with low swivel stools with backs. The lunch counter has an onyx top, 1¼ in. thick, and will seat 40 persons. Exit from the waiting room to the tracks, which are at an elevation several feet above the main floor, is up a short flight of steps and through a vestibule. The telegraph office and the public telephone booths are at the north end of the building, on either side of the steps leading to the tracks.

The interior finish of the building has been selected to give an air of simple dignity to the structure. The entire ground floor, as well as the floor of the balcony, is laid with terrazo in 24-in. squares, the alternate blocks being made with light and dark chips. The wood trim on the ground floor is of quarter-sawed oak, while that on the second floor is of fir.

The baggage wing extends westerly along the platform from the northwest corner of the main building and contains the baggage room and the express and mail departments. A basement occupies the entire area under the baggage wing, two Turnbull elevators, each 6 ft. by 14 ft., with a capacity of 4,000 lb., connecting the two floors. Heat for the station building and for steam lines to passenger coaches is supplied from a separate power house located north of the tracks, the pipes to the station being carried through a tunnel. The power house is of concrete and brick construction, with a moulded concrete cornice and a reinforced concrete chimney 85 ft. high. Steam is generated in three 150 hp. return tubular boilers equipped with turbine grates capable of burning a low grade of slack coal.

The construction of the station and power house was carried on by the Permanent Construction Company, Edmonton, which had the general contract for the work.

Data on Shop Building Costs

UNIT COSTS of the buildings comprising the various units of the extensive repair shop development of the Illinois Central at Paducah, Ky., have been made available through a paper presented before the Western Society of Engineers, Chicago, by Frank R. Judd, engineer of buildings. It is believed that these will prove of considerable value as information of this kind is not often available for publication. A second table shows the pounds of structural steel per square foot of ground plan and per cubic foot of contents.

Construction Cost

Building	Cost in Cents Per Cu. Ft.
Locomotive erecting building	11.60
Boiler shop	12.65
Paint and tank shop	15.00
Blacksmith shop	12.48
Carpenter and paint shop	18.65
Pipe, tin and electric shop	19.79
Iron shed and flue storage	19.52
Master mechanic's office	38.83
Coal and coke bins	20.40
Wash and locker building, No. 1	59.81
Wash and locker building, No. 2	57.25
Brass foundry	23.80
Store and oil house and oil paint store	27.93
Tractor garage	37.30
Wheel shop	18.89
Wood mill	17.18
Finished lumber shed	5.11
Paint store and waste vat	38.49
Power house	15.06
	Per Lin. Ft.
North and south craneway	$53.16
East and west craneway	$52.02

Structural Steel Used

Building	Lb. per Sq. Ft. of Ground Plan	Lb. per Cu. Ft. of Contents
Locomotive erecting shop	34.34	0.727
Boiler shop	35.3	0.763
Paint and tank shop	31.2	0.733
Blacksmith shop	29.5	0.703
Carpenter and paint shop	7.25	0.362
Tin, electric and air brake shop	10.33	0.543
Storehouse building	15.86	1.242
Covered platform	7.59	0.474
Oil and paint storehouse	17.56	1.089
Brass foundry	12.06	0.619
Iron shed	34.89	0.872
Power house	31.38	1.003
Car repair shop	24.70	0.623
Wood mill	15.60	0.635
Wheel shop	12.70	0.536
North and south craneway	849 lb. per lin. ft.	
East and west craneway	831 lb. per lin. ft.	

While these buildings, in general, follow the usual standards, the reader may obtain a more definite conception of their character by referring to the article on the Paducah shops in the *Railway Age* of August 6, 1927. The figures for costs include all structural items and heating but exclude electric lighting, machine foundations, mechanical equipment and cranes.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading during the week ended June 9 amounted to 995,960 cars, an increase of 61,746 cars as compared with loading in the holiday week preceding, but a decrease of 32,407 and 56,511 cars respectively as compared with loading in the corresponding weeks of 1927 and 1926. Among the commodity classifications loading of livestock only was larger than a year ago. Coal loading, with a total of 151,034 cars, was 7,787 cars smaller than that in the corresponding week of 1927. Loading in the Central Western and Southwestern districts was larger than last year but decreases were shown in other districts. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, June 9, 1928

Districts	1928	1927	1926
Eastern	230,110	237,392	246,429
Allegheny	204,590	209,444	216,363
Pocahontas	55,897	61,888	58,668
Southern	136,879	148,551	147,918
Northwestern	161,728	165,367	165,334
Central Western	135,767	134,974	143,262
Southwestern	70,989	70,751	74,497
Total Western Districts	368,484	371,092	383,093
Total All Roads	995,960	1,028,367	1,052,471
Commodities			
Grain and Grain Products	34,233	40,903	39,400
Live Stock	27,787	26,807	28,116
Coal	151,034	158,821	177,207
Coke	9,653	10,681	11,502
Forest Products	64,457	69,957	76,663
Ore	66,618	66,778	68,739
Merchandise L.C.L.	256,094	258,275	260,433
Miscellaneous	386,084	396,145	390,411
June 9	995,960	1,028,367	1,052,471
June 2	934,214	911,510	944,864
May 26	1,020,916	1,026,789	1,080,786
May 19	1,003,497	1,027,498	1,039,070
May 12	1,001,983	1,029,424	1,029,748
Cumulative total, 23 weeks	21,463,975	22,465,063	22,175,586

Canadian Loadings

Revenue car loadings at stations in Canada for the week ended June 9 totalled 66,442 cars, a decrease from the previous week of 2,633 cars and an increase over the same week last year of 3,689 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Totals for Canada		
June 9, 1928	66,442	37,389
June 2, 1928	69,075	37,112
May 26, 1928	62,066	38,992
June 11, 1927	62,753	37,125
Cumulative Totals for Canada		
June 9, 1928	1,459,905	917,861
June 11, 1927	1,389,337	894,212
June 12, 1926	1,300,846	859,739

The Long Island Electric Locomotive in Service

A 660-Hp., 87-Ton, Oil-Electric Switching Locomotive

Long Island installation is first application of Westinghouse-Beardmore power units in the United States

By J. H. Harvey

Railway Equipment Engineering Department, Westinghouse Electric & Manufacturing Company

A 660-hp. oil-electric switching locomotive which was placed in service on the Long Island Railroad on May 23, has many features which are unique. The locomotive consists of two units, each one complete with oil engine, generator, motors, control and auxiliary equipment and coupled together for normal multiple operation. Simultaneous control of the oil engine speeds and electrical connections on both units is effected by means of a single control lever on the master controller. Automatic operation of the control and auxiliary equipment has been incorporated wherever possible, thus relieving the engineman of distracting influences and insuring proper and efficient operation of the equipment under all conditions of locomotive speed and amount of trailing load.

The mechanical parts were built by the Baldwin Locomotive Works. Particular attention was given to providing a light weight yet sturdy frame and cab structure. Each unit has two axles, giving a locomotive wheel arrangement of 0-4-0 + 0-4-0 and permitting the total locomotive weight to be utilized in obtaining tractive effort.

For its initial operation the two units coupled together by means of a drawbar will be operated in multiple. This drawbar may be removed, however, and MCB couplers mounted in its place, thus making two independent operating units.

The cab equipment layout is such that an additional controller and brake pedestal may be added to provide double-end control in case single-unit operation is desired.

The engineman's helper's station in the leading end of each unit is separated from the engine and equipment compartment by means of a bulkhead. Doors at each side and a removable sheet in the center have been placed in this bulkhead. There is an aisle space along the two sides of the units which permit access to all parts of the apparatus in the cab.

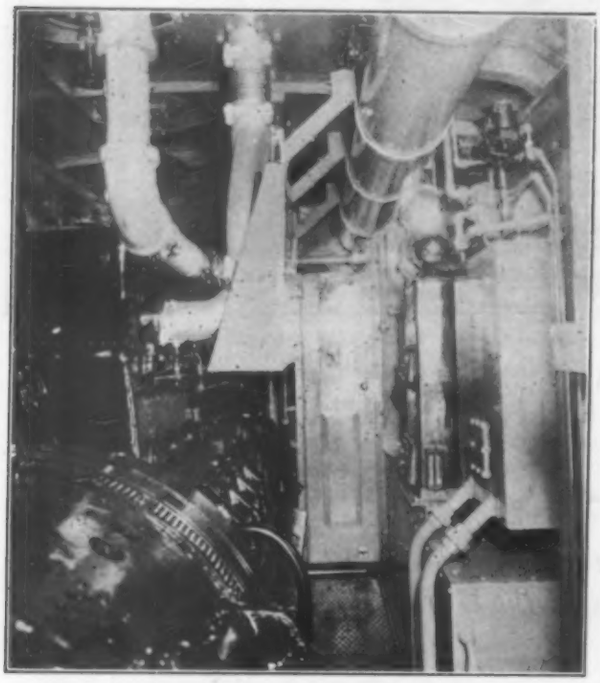
Oil Engine

The Westinghouse-Beardmore oil engine was built at the South Philadelphia Works of the Westinghouse Electric & Manufacturing Company. It is a lightweight, high-speed, six-cylinder, 330-hp., solid-injection, four-stroke-cycle, vertical engine having a speed range of from 300 to 800 r.p.m.

The engine is the result of two and one-half years experience in the field, others of similar type, having been operated in high speed motor car service for approximately one and a half million miles. The engines used in the Long Island Locomotive, including flywheel, weigh approximately 7000 lb., or 21.2 lb. per hp. This low weight allows a total locomotive weight of about 85 tons, which is sufficient for adhesion purposes in the service intended. Any excess of weight beyond this would only serve to reduce the effective draw-bar pull of the locomotive unit, which in turn means a reduction in useful load which the locomotive can haul at a maxi-

mum speed. Naturally, reduced weight and size of the oil engine means a corresponding reduction in weight of the transmission gear, mechanical parts, and cab structure and gives a maximum working space around the equipment.

The oil engine is a compact, well proportioned, and rugged piece of apparatus, and light weight is obtained through the proper selection of materials and careful



One of the Power Units as Placed in the Locomotive

design along stress lines. Features of this engine, besides its light weight, are economy, smoothness of operation obtained by large crankshaft and careful balancing of parts; accessibility for maintenance; and neatness of appearance, the exterior being almost free from the usual fixtures which are susceptible to damage. The fuel, lubricating oil, and cooling water pumps are integral with the engine proper.

This engine is placed longitudinally in the center of the equipment compartment on a cast steel bedplate which is bolted to the cab underframe. The bedplate provides unit support for the engine and generator end, and in addition supports the lubricating oil pump.

Main and Auxiliary Generators

Bolted to the engine flywheel is the generating unit consisting of a direct-current 750-volt, 210-kw. main generator and a direct-current, 64-volt, 5.3-kw. auxiliary generator. One bearing only is used at the commutator end of the main generator, the other end being carried by the engine main bearing. The rotor of the auxiliary generator is pressed on the main generator shaft extension. Its stator is bolted to the bracket of the main generator and may be readily removed without disturbing the main generator.

The main generator is used, first, for starting the oil engine, obtaining power from a 64-volt, 272-ampere-hour storage battery; second for charging the battery and operating the compressors at the engine idling speed of 300 r.p.m.; and third, for supplying power to the traction motors at higher engine speeds.

The auxiliary generator furnishes power for compressor operation and battery charging while the main generator is running above idling speed.

Traction Motors

Each unit is equipped with two motors having a one-hour rating of 300 amperes at 600 volts and a continuous rating of 140 amperes at 300 volts. This motor is totally enclosed and has oil seal armature and axle bearings.

A maximum locomotive speed of 34 miles an hour is attained by the use of the 16:66 gear ratio and 38-in. wheels. The maximum tractive effort of the locomotive is 49,000 lb.

Westinghouse No. 14 EL air brake equipment is used on the locomotive. Brake pipe, main reservoir pipe, and equalizing pipe connections are carried between cabs thus giving complete control of locomotive and train brakes from either unit. Two DH-20 compressors are mounted on the underframe at No. 1 end of each unit. These compressors are wound for 64 volts and operate from the main or auxiliary generators as explained above or from the battery when the engine is shut down. This switching of compressor connections is entirely automatic, thus assuring a full air supply at all times.

Control Apparatus

The motor reversers, all unit switches, magnetic contactors, battery cutout, motor cutout, and cab cutout switches, lighting, compressor and blower switches and fuses, generator field resistors, and torque governor comprising the control apparatus of each unit, are contained in two steel cabinets placed along one side of each cab.

The engine starting controller is mounted toward the front of the engine compartment at a point convenient for one-man operation of the control lever, fuel trip and decompression valves during the starting period. This controller connects the main generator to the storage battery and accelerates the engine to firing speed in successive steps in order to minimize the starting duty of the battery.

The master controller mounted in the operating compartment at the engineman's station has two levers only, the reverse drum and the power drum handles. The customary mechanical interlocking between these drums to prevent operating the reverse when power is applied to the traction motors has been incorporated.

Operation of the locomotive from the master controller is similar to the operation of ordinary electric locomotive equipment. With the controller in the "off" position all control switches are open and the engine rotates at 300 r.p.m. or idling speed. The next or "idle" position connects the battery to the main generator for charging at this same engine speed. To start the locomotive the control lever is notched out from the "idle" position to the first running notch. This movement connects the traction motors to the main generator at low engine speed.

Notching out to each successive position on the power drum increases the oil-engine speed which in turn increases the main generator voltage impressed on the traction motors. The locomotive acceleration is thus under complete control of one power drum lever. In notching back to stop the locomotive a mechanical interlock is employed to prevent overrunning the "idle" or battery charging position. This interlock must be operated by means of a push button mounted on the top of the controller whenever the control lever is thrown from "idle" to "off". Inadvertent loss of battery charge as the locomotive is at standstill is thus prevented.

Multiple operation of the two oil engines is effected

by means of a pneumatic piston incorporated in the engine speed governor. The governor position, and hence engine speed, is a function of the air pressure applied upon the piston. A governor control air line connecting the two governor air chambers in parallel is carried between the two units.

The necessary variation in air pressure is produced by a reducing valve, the setting of which is determined by the angular displacement of the control lever of the master controller. All necessary control air line cutouts are actuated by movement of the reverse drum lever. No additional operations on the part of the engineman while he is changing ends have therefore been added. This reducing valve is mounted on the base of the electrical control portion of the master controller, thus making an integral control unit the parts of which are, nevertheless, easily accessible.

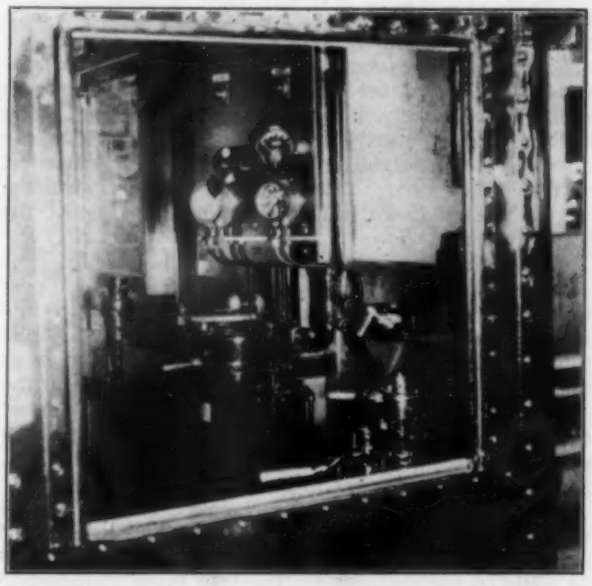
As the action of this system is based essentially upon a variation in air pressure, the leakage being negligible, the control is extremely sensitive and exact. Since the engine speed rises directly with the air pressure, an accidental parting of the coupling between units would serve to drop the speed on each engine to "idle" owing to loss of air pressure in the control line.

The torque governor may be termed the "heart of the control system." It is a relay having a saturation characteristic identical with that of the main generator and carrying two sets of windings. The main generator field current passes through one set and the other one receives a current proportional to the main generator armature current. The magnetic force produced by these windings is therefore proportional to the torque acting upon the main generator shaft. A spring restrains motion of the relay contacts until a torque of predetermined value is exceeded at which point the relay operates to open its contact points. This, in turn, drops out a magnetic contactor to insert a section of resistance in the main generator field circuit, thus lowering the voltage and consequently the load delivered by the main generator. As the moving parts of these relays have a small mass and as the increment of field resistance added is comparatively large, the movement of the relays when in action is quite rapid. The generator voltage is thus automatically maintained at such a value as will load the oil engine to its rated capacity and prevent overloading. It positively insures against the possibility of stalling the oil engine and permits the engineman to notch out to the last position in order to obtain full engine horsepower when moving a heavy load at low locomotive speeds.

The torque governor, in addition to the above features, makes possible an automatic transition of the motor connections from series to parallel. In order to obtain the benefit of maximum locomotive speed at large values of tractive effort the motors are connected in series as the locomotive is started. Further movement of the control lever then sets up the parallel motor connection control circuit. The completion of this control circuit is governed by the action of a current limit relay which drops when the tractive effort falls off to its proper value. The transition is thus made without loss of locomotive speed and tractive effort. The operation of the torque governor so softens the power surge, which would otherwise be set up, that the point at which the transition takes place is difficult to determine unless the generator ammeter is observed closely.

The meter and gage panel mounted in the engineman's compartment is equipped with two indicator lamps in addition to the main generator ammeter and air brake gages. These lamps show, by the intensity of light emitted, the rapidity of the torque governor operation and give the engineman a check on the operation of each oil engine and the load division between units.

Two emergency engine stop push-switches are mounted near the master controller directly under the light and compressor control switches. These switches enable the engineman to stop either oil engine from his position in the cab. Operation of these switches trips the overspeed governor on the oil engine and by-passes the fuel oil from the injection nozzles thereby causing the firing of the engine to cease immediately.



Engineman's Position as Seen Through the Side Window

Mounted on the bulkhead in full view of the engineman are the fuel oil and water gages. The latter combines the two features of showing the amount of cooling water in the tanks when the engine is stopped and indicating water flow through the cooling system. Excessive temperature of the cooling water is indicated by the operation of a pneumatic whistle placed in the engineman's compartment.

The possibility of dangerously low lubricating oil pressure to the bearings is prevented by a pressure switch which also operates the above signal whistle when the danger zone is reached. This signal operates in both units in case of failures on either.

Sanding of the rail in the direction of locomotive travel is insured by the use of one sander push-switch only. The electrical connections from this switch to the electro-pneumatic sander valves are carried through the reverse drum of the master controller so that the selection of the proper sanders is automatic.

Fuel Tanks and Cooling System

Each unit has one fuel oil tank mounted on the left hand side of No. 1 end and one on the right hand side of No. 2 end in the engine compartment. These tanks are connected by a common supply line to the oil engine. The fuel oil capacity is 210 gallons per unit or 420 gallons for the total locomotive.

Suspended from the roof directly above the aisles are the tanks containing the engine cooling water. This location was chosen to insure a full head of cooling water in the engine jacket under all conditions. In addition to this feature the tank design permits an advantageous disposal of the piping to and from the engine jacket.

The floor along the aisles is free from cross piping.

Positive cooling of the water and lubricating oil is insured by forced ventilation of the radiators which are placed on the clerestory hatch at No. 2 end of each unit. The blower motor is of weatherproof construction with a shaft extension on each end for accommodating two propeller type fans. Operation of the blower motor is under the control of a thermostat which starts the blowers when the upper limit of water temperature is reached. The design provides for overcooling so that the temperature falls to the point at which the blowers cut out. In this manner the cooling water is kept at the proper temperature for maximum engine efficiency. To provide for abnormal operating conditions, by-pass valves to prevent passage of the water and lubricating oil through the radiators have been incorporated in the piping. The radiators are mounted directly in front of the fans, the oil cooler to the right and the water cooler to the left of the blower motor. They are self-draining when the engine is shut down, thus preventing freezing of the water system in winter.

As the cooling system is placed directly over the generators, the hatch has been made in two parts, one portion covering the engine and the other, on which the radiating unit is placed, covering the generators. It is thus possible, therefore, to remove either the engine or the generators from the unit by simply uncovering the corresponding section of the clerestory leaving the other section intact. Removal of both portions of the hatch permits the complete power plant consisting of engine, bedplate, and generators to be taken out as a unit.

It should be noted that the complete removal of the power plant unit, though simple, is desirable or necessary only when complete overhauling or major repairs are to be made on the equipment. The free space surrounding the engine is sufficient to permit inspections and minor repairs with ease.

This is the first application of the Westinghouse-Beardmore engine and torque governor control to switching locomotive duty, and data gathered from tests and from preliminary service indicate that its operation will be as satisfactory as similar equipments now operating in high-speed passenger car service.

Principal data for 660-Hp., Oil-Electric Locomotive

Total weight	174,000 lb.
Classification of wheels	B-B
Weight on drivers	174,000 lb.
Number of driving axles	4
Starting tractive force, 25 per cent adhesion	43,500 lb.
Maximum starting tractive force, 28.4 per cent adhesion	49,500 lb.
Tractive force—hourly rating	19,900 lb.
Speed—hourly rating	8.75 mph.
Tractive force—continuous rating	6,500 lb.
Speed—continuous rating	26 mph.
Maximum safe speed	30 mph.
Track gauge	4 ft., 8½ in.
Total wheelbase	33 ft., 4 in.
Rigid wheelbase	9 ft., 6 in.
Length over-all (center line of coupler to center line of drawbar)	49 ft., 4 in.
Length of each cab	20 ft., 0 in.
Width of cab	9 ft., 7 in.
Height from rail to top of radiators	14 ft., 11 in.
Diameter of drivers	38 in.
Engines per cab	1 Westinghouse-Beardmore
Type and fuel	Solid injection, oil
No. of cylinders	6—8¼ in. x 12 in.
Cycle	4 stroke
Engine rating	330 hp. at 800 rpm.
Generators per cab	1—Type 477, 600-volt, d-c., 210 kw., direct connected to oil engine
Auxiliary generators per cab	1—Type YG-9A
No. and type of motors	4—Type 308-H
Gear ratio	16:66
Control	Electro-pneumatic, single end, multiple unit, series-parallel. Automatic control of engine output by torque governor.
Battery per cab	64 volts, 272 amp. hr.
Compressors per cab	2—20 cu. ft.
Radiators	Force-cooled with automatic blower control

Looking Backward

Fifty Years Ago

A locomotive on the Canada Southern (now part of the Michigan Central) completed a mileage of 64,811 in 1877 with an average cost for repairs of 1.012 cents per mile.—*Railway Age*, June 20, 1878.

The directors of the New York, Lake Erie & Western (now part of the Erie) on June 14 authorized the laying of a third rail from Waverly, N. Y., to Jersey City, N. J., 256 miles, and the purchase of the necessary equipment to change the operation from 6 ft. gage service to standard gage service. When completed this will provide a standard gage road between New York and Buffalo.—*Railway Age*, June 20, 1878.

One important bill was saved in the scramble that marked the close of the past session of Congress. On June 19, the closing day, the House passed the Senate bill providing for an auditor of Pacific railroad accounts. On the same day the House defeated the Senate bill providing for the establishment of a board of Pacific Railroad Commissioners.—*Railroad Gazette*, June 21, 1878.

Twenty-Five Years Ago

Bird M. Robinson, president of the Knoxville & Bristol (now part of the Southern), has been elected president of the Brunswick & Birmingham (consolidated with what is now the Atlanta, Birmingham & Coast).—*Railway Age*, June 26, 1903.

The Baltimore & Ohio has been devoting special attention to having shippers load cars to their full capacity and in April succeeded in moving 372,159 tons of coke in 15,562 cars. At the rate of loading obtained in April, 1902, this tonnage would have required 16,526 cars. In the same month of 1903 1,416,207 tons of bituminous coal was carried in 40,808 cars while at the rate of loading prevalent in April, 1902, this movement would have required 44,689 cars.—*Railway Age*, June 26, 1903.

The stockholders of the San Antonio & Arkansas Pass, at a meeting in San Antonio, Tex., on June 15, accepted the penalty prescribed by the Texas Railroad Commission and informed that body that the bonds pronounced to have been illegally issued, to the amount of $1,356,000 would be cancelled, the capital stock reduced from $5,000,000 to $1,000,000 and the property completely segregated from the Southern Pacific.—*Railway Age*, June 26, 1903.

Ten Years Ago

As a result of the present shortage of labor the Chicago, Burlington & Quincy has organized 50 students of the University of Chicago into a special gang which will start for Sheridan, Wyo., on June 17 to spend the summer on track work in that vicinity.—*Railway Age*, June 21, 1918.

The recently inaugurated practice of handling oil shipments in train lots has been so successful in the "mid-continent" field in Oklahoma that there is now a surplus of 1,850 tank cars in that territory and oil movements have been accelerated 100 per cent.—*Railway Age*, June 21, 1918.

A discussion of interchange rules on the floor of the convention of the Master Car Builders and Master Mechanics Association illustrated the confusion that has resulted from the Railroad Administration orders to eastern roads to supply western roads with box cars to handle what is expected to be a bumper grain crop. Cars have been sent indiscriminately and most of the western roads are overwhelmed with equipment unsuitable for grain loading. One road received 4,000 cars which must be repaired before they can be used. Of 2,000 on another railroad which were designated for grain shipment, only 15 per cent were fit for service, while a third line reports that only 20 per cent of the cars it received are suitable for use without repairs.—*Railway Age*, June 21, 1918.

New Books

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Florida and the Coast Line. Brief but important addition to localized railway history, well illustrated and provided with a map. 32 p. Pub. by Public Relations Department, Atlantic Coast Line Railroad Co., Wilmington, N. C., *Apply.*

Commodity Prices In Their Relation To Transportation Costs, Bulletin No. 30—Lumber. This bulletin deals with mill prices during 1924-1926 (calendar years), retail prices for the fiscal years ended June 30, 1925-1927, and freight rates for the period Jan. 1, 1924—June 30, 1927, applying to rail transportation only. 32 p. Pub. by Bureau of Railway Economics, Washington, D. C., *Apply.*

Kingdom of Serbs, Croats and Slovenes (Yugoslavia)—A Commercial and Industrial Handbook, by Kenneth S. Patton. "Economic and social conditions" p. 30-40. "Transportation and Communication" i. e. ports and harbors, maritime services, railway communications (p. 99-109 and map facing p. 99), river navigation, canal transportation, highway transport, and air services, postal, telegraph and telephone services, p. 88-125. U. S. Dept. of Commerce Trade Promotion Series no. 61. 261 p. Illustrations, Maps, Pub. by U. S. Govt. Print Off., Washington, D. C, 85 cents.

El Pueblo—Los Angeles Before the Railroads. "Los Angeles was half a century old when the first locomotive was built in the United States." p.3. Train and station of Los Angeles and San Pedro Railroad, 1869, p.56. "A Transcontinental railroad reaches the city" p.63-66. "Los Angeles of the middle seventies" p.67-75 is illustrated with some interesting old railroad pictures. 80 p. Pub. by Equitable Branch of the Security Trust & Savings Bank, Los Angeles, Calif.

Popularizing Public Transportation 1927, edited by Henry H. Norris for the Charles A. Coffin Foundation. A digest of methods and practices developed by electric railways and entered in the competition for the award for distinguished contributions to the development of the electric railway industry. Color and comfort in equipment, public and employee relations, advertising, and service improvements are emphasized. Illustrated and Indexed. 254 p. Pub. by American Electric Railway Association, New York City. $2.00.

Periodical Articles

British Road-Rail Trucks, by Harold A. Burch. Four types of containers, and operation of container system described. Commerce Reports, June 18, 1928, p. 722-723.

"Carry Your Bags, Sir?" by Mildred Harrington. Some of the numerous and varied things put up to the Red Caps at Grand Central. American Magazine, June 1928, p. 32-33, 84-90.

Who Said The Day of Railroad Giants Is Over? by Sherman Gwinn. A sketch of the career of J. J. Bernet. American Magazine, June 1928, p. 24-25, 129-133.

Industry at the Joy Stick, by Commander Ralph D. Weyerbacher. Steps in the growth of aviation from experiments to transcontinental services. "Railroads and air lines" p. 145-146. Saturday Evening Post, June 16, 1928, p. 18-19, 144-146.

Notes on Index-Numbers, by Prof. A. L. Bowley. Unweighted means, Index-numbers and sampling, Cost-of-living index-numbers, Causes of error, and Wage index-numbers are discussed. Economic Journal, June 1928, p. 216-237.

Odds and Ends

Gilbert Anderson is a plumber in Nebraska and like most men of that profession he likes to fix things in his own way and do his own forgetting. When he drives his automobile over railroad tracks we assume that he likes to do his own arranging of the time and place. But Mr. Anderson recently overlooked the fact that as a business man on a holiday he could not arrange his own time and place and that on Sunday he could not drive indiscriminately about the country as he might be wont to do when frantically rushing for forgotten tools on week days. On a Sunday at Fremont, Neb., he failed to notice that a moving freight train occupied the crossing. He bumped into the twelfth car in front of the caboose, derailing one pair of trucks, and causing six cars to leave the track when the derailed truck struck a switch stand. Just to call Anderson's attention to his forgetful habit, Chicago & North Western lawyers have about decided to send him a civil action bill for some $6,000 damage to railroad property. His automobile was practically demolished though he escaped unhurt.

Coat, Pants & Vest

Speaking of peculiar railway names, the line between Cincinnati, Ohio and Portsmouth, formerly had an unusual nickname. Before being acquired by the Norfolk & Western, it was the Cincinnati, Portsmouth & Virginia. At that time, because of its initials, it was known as the "Coat, Pants & Vest Line." Old-timers still refer to it in that fashion.

Presidents' Specials

Engineman Frank P. Kinsley, of the Boston & Maine, recently handled President Coolidge's special train over that railway. This confers upon Kinsley the unusual distinction of running trains for four presidents during their tenure of office. Besides President Coolidge, Presidents Roosevelt, Wilson and Taft have honored Kinsley with their patronage.

While we are on the subject, it might be mentioned that President Coolidge recently rode the Western Maryland to Gettysburg, Pa., to deliver an address. The conductor who handled the train was Jacob Eckert, whose father was conductor of the train on which Abraham Lincoln rode when he went to Gettysburg in 1863 to deliver his famous address.

The Lincoln Funeral Car

The fate of the Lincoln funeral car has been the subject of much conjecture and controversy. In a letter to the editor of the Baltimore & Ohio Magazine, Carl R. Gray, president, Union Pacific, settles the matter as follows: "As a matter of information, the 'Lincoln Car' was purchased by the Union Pacific. In November, 1903, the car was sold by the Union Pacific to F. B. Snow, who placed it in the 'Lincoln Exhibit' at the St. Louis World's Fair. In 1905, Hon. Thomas Lowry purchased the car and presented it to the City of Minneapolis, and it was placed on display at 37th avenue and Jackson street, Some time during 1911, the grass around the car caught fire and the car was burned."

Times Have Changed

Forty years ago it was the custom on the Concord & Montreal to use the ribbon method of dispatching extra trains. If an extra train was to be run, word would be sent to the station agents by some preceding train. The conductor would wear a ribbon on his vest as a reminder for him to tell the agents about the extra train. Railroading in those days was a rather happy-go-lucky affair. Often, in the case of broken rails, trains would stop at a siding, pick up a rail and replace the broken one. Sometimes, when a train was waiting on a siding for another train then due, the crew listened for the whistle and looked for smoke, but if nothing could be seen or heard, those in charge would go on, trusting to luck they would not have a collision.— Erie Magazine.

NEWS *of the* WEEK

Baltimore & Ohio, No. 7, Leaving Philadelphia.

THE BROTHERHOOD OF LOCOMOTIVE FIREMEN AND ENGINEMEN, meeting in convention at San Francisco, Cal., on June 15, took action which established a reserve fund of $12,000,000 to cover payments to members of the Brotherhood who have reached the age of 70 years.

THE UNION PACIFIC has purchased the Portland Flouring Mill which is the largest privately-owned grain terminal on the Pacific Coast. The property is located in Portland, Ore., and has a capacity of 500,000 bushels of bulk grain and 600,000 bushels of sacked grain.

THE VETERAN EMPLOYEES' ASSOCIATION of the Louisville & Nashville held its annual reunion at Birmingham, Ala., on June 16, with an attendance of about 800. The organization is made up of employees who have been continuously in the employ of the road for not less than 25 years.

W. K. HATT, professor of civil engineering at Purdue University, Lafayette, Ind., has been designated by the president of the American Railway Engineering Association to represent that association at the inauguration of a library at the University of Louvain at Louvain, Belgium, on July 4, 1928.

HENRY EARLE RIGGS, professor and head of the department of civil engineering, University of Michigan, has been granted two years' leave of absence by the Board of Regents of the university, at the end of which time he will retire permanently from the faculty with the emeritus title. Professor Riggs is taking this step in order to give his entire time to consultation on railway valuation and regulation matters, having opened an office at 527 East Liberty street, Ann Arbor.

Railway Executives Meet

The executive committee of the Association of Railway executives held its regular early summer meeting on June 14 in Atlantic City.

H. A. Scandrett, president of the Chicago, Milwaukee, St. Paul & Pacific was elected a member of the executive committee, vice H. E. Byram. Other new members were also added to the membership of the committee as follows: George B. Elliott, president, Atlantic Coast Line; Eppa Hunton, Jr., president, Richmond, Fredricksburg & Potomac. L. R. Powell, Jr., president Seaboard Air Line and Fairfax Harrison president, Southern. The Southern Railway returned to membership in the Association of Railway Executives, from which it resigned in 1921. Alfred P. Thom, general counsel of the association, made a report relative to the legislative situation that existed at the close of Congress in May. A number of other matters of a more or less routine nature were also considered.

The regular quarterly meeting of the board of directors of the American Railway Association was also held on June 14. The board received reports from the Car Service Division relative to the transportation situation and the traffic outlook for the immediate future. A report was also received from the Bureau of Railway Economics in respect to capital expenditures in the first three months of this vear. R. H. Aishton, president of the American Railway Association and chairman of the executive committee of the Association of Railway Executives, presided at both meetings.

Texas & Pacific Opens Lancaster Yards

The new Lancaster Yards of the Texas & Pacific at Tremble, 3 miles west of Fort Worth, Tex., were formally opened on June 12 when railroad and business men, estimated to number more than 5,000 persons, inspected the yard and its facilities. A special train was run from Fort Worth and at noon the railroad served a buffet lunch. From 10 o'clock in the morning until 4 o'clock in the afternoon the yard was in operation, allowing visitors to watch humping operations and inspect the car retarders, scales, car icing dock, repair tracks, roundhouse and engine terminal facilities, locomotive repair shop and power house. This new construction removes the freight terminal from the congested business section of Fort Worth and enables the railroad to classify 3,000 cars a day. The Fort Worth Association of Commerce tendered J. L. Lancaster, president of the Texas & Pacific, for whom the yard is named, a banquet in the evening and presented him with a silver tray, a gold key to the city and the gold spike that was driven to mark the entry of the railroad into Fort Worth in 1876.

Old Locomotives Returned to Nova Scotia

The two old English locomotives, "Samson" and "Albion," the first steam engines to run on rails in Nova Scotia, which were in service there for 48 years and 62 years, respectively, have been returned by the Baltimore & Ohio, and were formally handed over to the Province of Nova Scotia at Halifax, on June 21, with elaborate ceremonies. John J. Cornwell, general counsel of the road, made the presentation address, and the engines were received on behalf of the provincial government by the premier, Hon. E. N. Rhodes.

English Locomotive of 1839

This engine was in service from 1840 to 1902, and except for the fact that the coal mines which it served had become exhausted, it might have been in service today.

These engines were bought by the Baltimore & Ohio some years ago, for its historical collection and were exhibited at its centenary pageant last autumn at Baltimore. The engines were built by Timothy Hackworth in 1838-1839 and were used by the Albion Coal & Iron Company, hauling coal from the mines at Stellarton, N. S. to the docks at Pictou and New Glasgow. Both engines were six-coupled (0-6-0) but were slightly different in design, the Samson having its cylinders placed vertically.

A De Luxe Train Without Pullmans

Beginning June 24, the New York Central is to run a daily express passenger train from New York to Buffalo, (440 miles) without parlor cars. It leaves at 9:30 a. m.; and a similar train from Buffalo to New York, starts at the same hour, both arriving at destination at 8:15 p. m. The trains will stop at the 17 principal stations on the road.

Each consists of a baggage car, a smoking car, three coaches, seating 82 persons each, a dining car, and an observation car which is equipped with movable wicker chairs seating 54 persons. A feature of the three coaches is the provision of "a soft and comfortable individual seat" for each passenger. These seats are substantially equal to a parlor car chair, but they are built in pairs so that no more space is taken than would be occupied by ordinary coach seats. There will be a porter in the observation car and another to look after the three coaches.

The coaches are decorated in brown with walnut grain finish and brown carpet in the aisles; and each has hot and cold running water in the washrooms.

One of the new trains is this week being exhibited at the principal cities along the line.

The New York Central also announces that, on June 24, a new ten-hour day train, the "Laurentian," is to be put in service between New York and Montreal over the Delaware & Hudson. With this addition, this route will have, each way,

(*Continued on page 1460*)

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 185 Steam Railways, Including 16 Switching and Terminal Companies.

FOR THE MONTH OF APRIL, 1928 AND 1927

Item	United States		Eastern District		Pocahontas Region		Southern Region		Western District	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Average number of miles operated	239,851.52	238,885.11	59,400.85	59,452.33	5,623.45	5,616.21	40,018.54	39,713.75	134,808.68	134,102.82
Revenues:										
Freight	$355,995,269	$371,570,620	$158,028,516	$167,499,234	$16,699,505	$20,528,484	$49,354,143	$54,374,227	$131,913,105	$129,168,675
Passenger	a70,950,561	b77,371,939	37,890,591	39,842,357	1,462,635	1,765,727	9,470,075	10,553,905	22,127,260	25,209,950
Mail	7,885,554	7,941,333	2,986,660	3,062,075	206,594	213,158	1,178,062	1,176,638	3,514,238	3,489,462
Express	12,501,692	13,451,254	5,776,378	6,282,008	268,731	324,635	2,050,191	1,981,454	4,406,392	4,863,157
All other transportation	17,017,085	17,791,929	9,264,429	9,561,643	223,255	275,780	1,245,900	1,391,434	6,283,501	6,563,072
Incidental	9,234,146	10,142,575	4,823,591	5,155,506	312,532	394,774	1,175,908	1,223,735	2,922,115	3,368,560
Joint facility—Cr.	1,119,171	1,081,201	465,277	464,013	20,432	15,341	145,767	138,222	487,695	463,625
Joint facility—Dr.	393,073	422,888	140,041	139,650	3,137	3,098	33,620	40,403	216,275	239,737
Ry. operat'g revenues	474,310,405	498,927,963	219,095,401	231,727,186	19,190,547	23,514,801	64,586,426	70,799,212	171,438,031	172,886,764
Expenses:										
Maintenance of way and structures	70,801,831	75,949,311	28,158,767	30,142,140	2,806,562	3,249,879	9,148,275	10,338,825	30,688,227	32,218,467
Mainten'ce of equipm't	96,172,396	102,707,775	44,954,400	49,362,717	4,437,877	4,961,834	12,839,542	13,563,224	33,940,577	34,820,000
Traffic	10,183,692	9,949,810	3,829,359	3,646,319	247,126	259,535	1,657,718	1,697,307	4,449,489	4,346,649
Transportation	166,984,282	176,845,605	78,981,111	83,826,881	5,358,610	6,092,298	22,381,939	24,618,899	60,262,622	62,307,527
Miscellaneous operat'ns	4,380,521	4,453,985	2,077,295	2,094,810	89,243	91,290	528,969	554,262	1,685,014	1,713,623
General	16,028,491	16,101,815	7,056,821	7,185,901	600,979	553,870	2,092,355	2,157,302	6,278,336	6,204,742
Transportation for investment—Cr.	1,170,211	1,050,418	158,787	171,860	45,283	27,614	68,129	82,277	898,012	768,667
Ry. operat'g expenses	363,381,002	384,957,883	164,898,966	176,086,908	13,495,114	15,181,092	48,580,669	52,847,542	136,406,253	140,842,341
Net revenue from railway operations	110,929,403	113,970,080	54,196,435	55,640,278	5,695,433	8,333,709	16,005,757	17,951,670	35,031,778	32,044,423
Railway tax accruals	30,674,549	30,700,611	12,994,244	12,809,871	1,662,350	1,781,163	4,270,756	4,281,776	11,747,199	11,827,801
Uncollectible ry. rev's	117,014	158,190	53,063	71,409	1,626	4,415	16,668	25,756	45,657	56,610
Ry. operating income	80,137,840	83,111,279	41,149,128	42,758,998	4,031,457	6,548,131	11,718,333	13,644,138	23,238,922	20,160,012
Equip't rents—Dr. bal.	7,549,220	7,443,345	4,160,624	4,150,598	d566,484	d464,585	919,929	1,059,388	3,035,151	2,697,944
Joint facility rent—Dr. balance	2,041,072	2,159,445	982,091	1,072,743	103,070	98,080	65,591	84,814	890,320	903,808
Net railway operating income	70,547,548	73,508,489	36,006,413	37,535,657	4,494,871	6,914,636	10,732,813	12,499,936	19,313,451	16,558,260
Ratio of expenses to revenues (per cent)	76.61	77.16	75.26	75.99	70.32	64.56	75.22	74.64	79.57	81.47

FOR FOUR MONTHS ENDED WITH APRIL, 1928 AND 1927

Average number of miles operated	239,689.47	238,742.61	59,392.03	59,453.03	5,621.62	5,616.80	40,023.47	39,626.58	134,652.35	134,046.20
Revenues:										
Freight	1,427,137,160	1,490,329,918	617,674,886	667,552,685	71,146,870	82,356,080	200,323,610	212,796,061	537,991,794	527,625,092
Passenger	c289,450,791	c314,281,308	148,441,040	156,182,004	5,866,163	6,979,142	42,113,863	47,106,571	93,029,725	104,013,591
Mail	31,492,418	31,404,711	11,862,303	11,903,752	855,867	834,542	4,734,997	4,687,226	14,039,251	13,979,191
Express	41,825,495	43,563,078	19,066,408	20,882,727	986,561	1,040,959	6,327,492	5,936,466	15,445,034	15,702,926
All other transportation	64,669,854	66,424,278	35,805,419	36,706,931	757,695	848,934	4,173,711	4,516,427	23,933,029	24,351,986
Incidental	35,994,279	38,905,298	18,398,951	19,867,187	1,276,594	1,604,264	4,772,225	5,048,130	11,546,509	12,385,717
Joint facility—Cr.	4,424,034	4,486,158	1,752,246	1,854,254	53,641	54,668	537,854	579,013	2,080,293	1,998,223
Joint facility—Dr.	1,480,466	1,701,304	527,808	540,004	9,810	9,614	123,623	136,922	819,225	1,014,764
Ry. operat'g revenues	1,893,513,565	1,987,693,445	852,473,445	914,409,536	80,933,581	93,708,975	262,860,129	280,532,972	697,246,410	699,041,962
Expenses:										
Maintenance of way and structures	249,623,314	263,344,848	102,399,303	109,470,268	11,793,108	12,473,382	36,168,959	39,489,023	99,261,944	101,912,175
Mainten'ce of equipm't	389,434,072	417,376,390	181,732,392	201,012,799	18,169,977	20,156,789	52,061,833	54,519,369	137,469,870	141,687,433
Traffic	40,921,519	39,268,253	15,220,099	14,354,686	1,055,972	1,021,258	7,146,346	7,059,975	17,499,102	16,832,334
Transportation	690,570,715	732,337,556	324,865,282	350,790,495	22,498,118	25,129,706	92,743,531	99,923,391	250,463,784	256,493,964
Miscellaneous operat'ns	17,826,896	18,146,330	8,438,032	8,516,345	341,909	359,396	2,376,229	2,447,782	6,670,726	6,822,807
General	64,529,883	64,094,033	28,719,389	29,150,608	2,449,263	2,200,393	8,372,671	8,423,439	24,988,560	24,319,593
Transportation for investment—Cr.	4,346,338	4,040,381	577,676	764,204	134,118	92,480	370,384	624,711	3,264,160	2,558,986
Ry. operat'g expenses	1,448,560,061	1,530,527,029	660,796,821	712,530,997	56,174,229	61,248,444	198,499,185	211,238,268	533,089,826	545,509,320
Net revenue from railway operations	444,953,504	457,166,416	191,676,624	201,878,539	24,759,352	32,460,531	64,360,944	69,294,704	164,156,584	153,532,642
Railway tax accruals	119,561,259	121,033,631	47,973,835	48,398,864	6,692,582	7,148,552	16,948,830	16,686,357	47,946,012	48,799,858
Uncollectible ry. rev's	434,447	508,840	214,413	205,876	7,126	12,504	62,491	79,650	150,417	210,810
Ry. operating income	324,957,798	335,623,945	143,488,376	153,273,799	18,059,644	25,299,475	47,349,623	52,528,697	116,060,155	104,521,974
Equip't rents—Dr. bal.	29,222,068	28,305,127	15,921,181	15,688,964	d2,033,673	d1,800,248	3,050,890	3,770,740	12,283,670	10,645,671
Joint facility rent—Dr. balance	7,842,886	8,267,892	3,995,135	4,064,492	462,864	417,993	155,946	332,393	3,228,941	3,453,014
Net railway operating income	287,892,844	299,050,926	123,572,060	133,520,343	19,630,453	26,681,730	44,142,787	48,425,564	100,547,544	90,423,289
Ratio of expenses to revenues (per cent)	76.50	77.00	77.52	77.92	69.41	65.36	75.52	75.30	76.46	78.04

a Includes $3,160,442 sleeping and parlor car surcharge. b Includes $3,178,073 sleeping and parlor car surcharge. c Includes $12,683,268 sleeping and parlor car surcharge. d Deficit or other reverse items. e Includes $12,832,356 sleeping and parlor car surcharge.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Operating Statistics of Large Steam Railways—Selected Items for April, 1928, Com

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross, Excluding locomotives and tenders	Ton-miles (thousands): Net, Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany	1928 407	182,769	194,099	19,715	4,964	67.7	250,995	92,314	102	20	16.4	24
	1927 407	207,250	221,139	22,926	5,058	67.1	257,385	92,532	112	13	10.5	8
Boston & Maine	1928 2,074	401,606	517,086	44,032	12,363	69.8	625,280	238,638	260	57	18.1	29
	1927 2,085	488,796	555,208	50,844	12,580	71.2	634,684	249,207	283	73	20.5	30
N. Y., New H. & Hart.	1928 2,130	525,616	584,035	35,798	16,184	67.2	859,735	344,645	315	61	16.3	48
	1927 2,140	569,221	603,301	37,636	16,279	68.8	831,383	329,431	306	68	18.2	24
Great Lakes Region:												
Delaware & Hudson	1928 875	319,490	432,258	49,058	9,880	63.4	600,822	279,270	246	36	12.6	86
	1927 875	344,336	469,450	53,812	10,787	65.4	653,105	316,680	249	34	12.0	82
Del., Lack. & Western	1928 998	546,823	620,339	71,738	17,857	66.2	1,013,988	423,133	251	56	18.3	8
	1927 999	592,652	688,188	82,611	19,137	67.5	1,076,826	459,134	272	48	15.0	20
Erie (inc. Chi. & Erie)	1928 2,317	868,644	949,899	78,783	37,278	63.5	2,190,518	898,339	413	119	22.4	44
	1927 2,317	905,683	1,013,233	102,536	34,885	64.5	2,044,333	863,441	513	138	21.1	100
Lehigh Valley	1928 1,346	521,655	573,866	66,815	16,888	64.2	983,656	413,363	358	74	17.1	88
	1927 1,346	577,418	633,062	76,526	18,287	64.9	1,065,612	464,702	354	87	19.7	70
Michigan Central	1928 1,822	570,710	592,733	20,014	19,698	60.4	1,092,830	366,698	200	78	27.9	30
	1927 1,820	576,272	592,195	19,411	19,276	61.0	1,076,530	369,629	242	63	20.7	57
New York Central	1928 6,459	1,959,833	2,177,748	153,507	76,667	61.7	4,542,093	1,848,023	1,056	343	24.5	295
	1927 6,478	1,953,411	2,197,333	138,180	77,588	63.1	4,585,562	1,930,654	1,122	309	21.6	334
New York, Chi. & St. L.	1928 1,665	623,613	631,964	5,559	20,588	62.2	1,158,059	425,918	231	59	20.2	59
	1927 1,665	610,227	615,490	5,831	19,884	65.5	1,070,420	401,782	231	60	20.7	51
Pere Marquette	1928 2,181	416,359	423,181	6,203	11,384	63.6	648,363	265,728	180	42	19.0	23
	1927 2,180	437,888	443,616	6,474	11,533	62.9	663,157	271,118	187	36	16.1	19
Pitts. & Lake Erie	1928 231	110,567	113,032	1,417	3,895	59.6	315,094	172,284	54	18	25.2	12
	1927 231	117,701	119,389	2,305	4,305	62.4	332,291	187,258	56	18	24.5	11
Wabash	1928 2,497	773,464	809,407	12,467	23,415	62.6	1,317,577	461,493	302	64	17.5	53
	1927 2,497	718,970	751,566	10,341	21,733	63.9	1,193,868	415,565	324	60	15.7	58
Central Eastern Region:												
Baltimore & Ohio	1928 5,534	1,802,945	2,123,218	169,012	54,196	62.0	3,503,183	1,610,468	993	271	21.4	149
	1927 5,541	1,980,001	2,303,005	195,857	57,692	61.7	3,819,634	1,812,889	1,062	213	16.7	117
Central of New Jersey	1928 691	258,175	280,561	47,740	7,857	59.1	519,310	245,223	181	34	15.8	36
	1927 691	264,805	285,955	49,555	8,089	59.4	531,396	252,391	175	46	20.8	14
Chicago & Eastern Ill.	1928 945	221,354	221,964	3,349	5,857	62.9	348,847	149,416	113	56	33.3	46
	1927 945	244,816	247,727	3,927	6,310	62.5	378,498	164,563	114	57	33.5	35
Clev., Cin., Chi. & St. L.	1928 2,370	684,185	709,855	15,166	21,846	61.9	1,369,510	610,985	328	111	25.2	63
	1927 2,374	731,185	771,868	21,337	22,595	60.2	1,455,697	649,283	335	96	22.3	31
Elgin, Joliet & Eastern	1928 461	134,223	142,573	6,190	3,850	63.2	283,007	144,582	78	12	13.1	...
	1927 461	129,957	137,603	5,607	3,641	62.3	279,782	144,894	80	11	11.6	...
Long Island	1928 396	50,684	52,280	17,098	645	55.8	43,119	17,211	66	8	10.5	...
	1927 393	48,743	53,796	15,640	649	54.8	43,914	17,961	50	9	15.7	...
Pennsylvania System	1928 10,853	3,742,008	4,244,645	361,776	130,154	64.2	8,291,074	3,736,113	2,845	383	11.9	851
	1927 10,844	4,350,724	4,768,400	376,526	134,209	64.1	8,598,229	3,922,091	2,863	442	13.4	661
Reading	1928 1,129	564,850	621,570	52,543	16,309	60.2	1,138,773	566,916	312	71	18.5	50
	1927 1,130	643,398	700,074	69,692	17,807	60.8	1,232,631	626,699	322	68	17.5	34
Pocahontas Region:												
Chesapeake & Ohio	1928 2,719	1,016,653	1,096,632	41,031	32,995	56.6	2,622,990	1,395,705	554	89	13.8	104
	1927 2,650	1,152,500	1,241,082	46,907	38,585	56.6	3,098,630	1,667,756	552	89	13.8	57
Norfolk & Western	1928 2,231	742,769	891,603	29,188	27,474	60.7	2,159,248	1,138,720	524	53	9.2	159
	1927 2,232	842,339	1,032,733	36,269	29,853	60.2	2,426,353	1,305,706	560	48	7.9	142
Southern Region:												
Atlantic Coast Line	1928 5,105	695,663	700,342	10,761	18,032	60.1	1,008,085	369,464	429	54	11.2	86
	1927 5,034	859,430	870,992	14,139	23,412	59.0	1,320,818	476,640	421	63	13.0	65
Central of Georgia	1928 1,898	266,920	269,041	4,270	6,553	69.0	353,323	145,264	142	24	14.5	11
	1927 1,898	307,268	310,470	5,851	7,529	70.6	408,181	177,596	138	25	15.1	11
Ill. Cent. (inc. Y. & M. V.)	1928 6,595	1,912,617	1,932,352	31,493	51,109	61.0	3,310,901	1,348,042	766	98	11.3	36
	1927 6,590	1,916,382	1,934,687	45,554	51,308	62.9	3,256,138	1,367,790	794	108	12.0	32
Louisville & Nashville	1928 5,061	1,597,287	1,661,534	56,456	33,406	59.3	2,286,199	1,078,402	603	104	14.7	50
	1927 5,048	1,813,254	1,901,609	58,945	37,762	58.9	2,622,302	1,246,975	607	120	16.5	9
Seaboard Air Line	1928 4,484	571,625	589,993	8,755	14,533	60.5	846,318	306,689	267	68	20.3	3
	1927 4,237	638,578	651,028	7,903	15,800	60.1	938,429	349,904	247	51	17.0	7
Southern	1928 6,718	1,456,978	1,487,898	33,631	36,359	62.7	2,071,866	820,794	830	110	11.7	74
	1927 6,718	1,607,222	1,638,611	39,054	39,490	64.4	2,213,489	890,505	833	118	12.4	18
Northwestern Region:												
Chi. & North Western	1928 8,463	1,334,047	1,398,939	24,845	32,857	63.0	1,872,452	720,223	778	145	15.8	134
	1927 8,463	1,241,844	1,277,406	20,387	31,227	66.8	1,705,488	686,715	730	142	16.3	142
Chi., Milw., St. P. & Pac.	1928 11,247	1,474,587	1,573,046	97,380	45,427	65.6	2,568,964	1,055,955	820	145	15.1	207
	1927 11,202	1,437,131	1,517,165	87,374	42,927	66.3	2,357,438	973,635	784	189	19.4	195
Chi., St. P., Minn. & Om.	1928 1,724	285,012	299,669	12,569	6,000	65.7	328,087	131,200	152	26	14.6	24
	1927 1,724	273,852	290,295	11,381	5,839	68.8	306,546	125,735	166	31	15.8	38
Great Northern	1928 8,163	710,907	735,132	46,499	25,258	68.8	1,422,231	632,974	539	123	18.6	115
	1927 8,164	702,977	725,527	40,282	25,078	68.1	1,417,074	647,777	550	166	23.2	138
Minn., St. P. & S. Ste. M.	1928 4,358	479,992	494,619	4,757	12,842	67.9	674,752	287,653	231	29	11.2	28
	1927 4,368	469,710	483,415	3,937	12,244	66.7	648,448	276,284	288	37	11.4	31
Northern Pacific	1928 6,413	750,791	803,817	46,347	26,605	71.5	1,439,988	643,576	438	130	22.9	56
	1927 6,496	746,076	788,682	41,685	25,459	71.0	1,377,339	612,473	470	167	26.2	92
Oreg.-Wash. R. R. & Nav.	1928 2,246	182,186	193,357	15,123	5,527	70.2	316,311	142,188	125	17	12.1	7
	1927 2,164	179,376	188,662	13,641	5,453	74.2	296,885	134,513	130	22	14.3	13
Central Western Region:												
Atch., Top. & S. Fe (including P. & S. F.)	1928 10,395	1,558,291	1,704,299	89,890	51,195	64.9	2,980,613	1,073,399	786	133	14.5	202
	1927 10,377	1,672,115	1,807,448	96,801	54,014	65.4	3,138,820	1,138,438	756	156	17.1	128
Chicago & Alton	1928 1,000	265,474	287,805	2,300	6,482	60.8	386,060	145,895	119	34	22.2	23
	1927 1,016	262,440	282,196	4,355	5,818	58.0	356,812	130,487	140	18	11.1	36
Chi., Burl. & Quincy	1928 9,320	1,329,846	1,378,624	52,113	41,753	65.1	2,323,572	1,016,630	740	165	18.2	100
	1927 9,334	1,299,157	1,346,143	52,857	37,722	64.2	2,105,413	905,335	716	203	22.1	61
Chi., Rock I. & Pacific	1928 7,569	1,334,905	1,388,969	13,933	33,243	58.9	1,993,126	736,887	585	101	14.8	104
	1927 7,562	1,358,200	1,409,305	14,349	32,510	60.7	1,888,562	701,699	553	112	16.8	39
Denver & R. G. Wn.	1928 2,547	194,834	223,920	36,569	6,049	68.7	360,291	170,851	221	51	18.6	48
	1927 2,536	193,025	225,556	38,679	5,767	71.0	329,278	156,309	218	49	18.3	37
Oregon Short Line	1928 2,539	279,636	301,589	34,220	8,685	71.1	503,357	223,254	165	25	13.0	32
	1927 2,539	249,221	268,792	26,271	7,562	72.8	427,566	193,921	184	21	10.1	53
So. Pacific—Pacific Lines	1928 8,746	1,489,139	1,617,745	210,940	45,168	59.7	2,837,963	1,011,725	699	234	25.1	70
	1927 8,723	1,470,460	1,595,248	218,340	44,355	62.0	2,747,036	1,026,157	685	254	27.1	70
Union Pacific	1928 3,712	925,279	949,104	42,917	36,449	69.2	1,989,858	763,562	404	58	12.5	128
	1927 3,714	736,257	757,431	39,193	30,406	76.4	1,544,288	631,972	454	49	9.8	199
Southwestern Region:												
Gulf, Colo. & S. Fe	1928 1,933	269,567	278,411	6,123	8,460	64.0	512,999	220,137	132	23	15.0	36
	1927 1,933	363,999	379,293	12,789	10,337	59.2	671,037	285,186	143	26	15.6	6
Mo.-Kans.-Tex. Lines	1928 3,176	403,499	406,486	10,734	13,378	57.8	804,297	295,302	197	41	17.1	84
	1927 3,176	462,062	468,102	10,538	14,764	56.9	903,784	326,469	218	35	13.8	88
Missouri Pacific	1928 7,433	1,280,885	1,321,562	39,855	38,640	65.1	2,259,633	934,622	538	85	13.7	28
	1927 7,317	1,188,499	1,234,207	39,086	33,228	66.7	1,872,746	777,537	524	72	12.1	6
St. Louis-San Francisco	1928 4,982	760,993	775,041	8,723	18,241	59.7	1,097,295	434,982	387	54	12.3	53
	1927 4,860	776,406	793,819	11,152	18,791	61.6	1,118,424	452,158	386	68	15.0	75
Texas & New Orleans	1928 4,708	795,096	799,257	1,767	16,650	63.3	970,776	373,060	273	67	19.8	33
	1927 4,570	789,233	792,359	1,617	16,959	64.1	994,233	401,938	259	61	19.1	32
Texas & Pacific	1928 2,015	546,746	546,746	7,084	14,235	56.2	958,090	367,052	192	21	9.8	13
	1927 1,954	394,150	394,150	1,467	10,513	59.9	650,678	235,659	158	18	10.3	15

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

pared with April, 1927, for Roads with Annual Operating Revenues above $25,000,000.

Region, road and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross tons per train, excluding locomotives and tenders	Net tons per train	Net tons per loaded car	Net ton-miles per car-day	Car miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive miles per locomotive-day
New England Region:													
Boston & Albany.....1928	3,196	4,741	7,937	7.3	19,012	1,373	505	18.6	388	30.8	7,560	180	58.3
1927	3,038	5,167	8,205	3.0	16,492	1,242	446	18.3	376	30.6	7,578	179	64.9
Boston & Maine.....1928	12,339	10,658	22,997	4.7	18,152	1,557	594	19.3	346	25.7	3,836	120	58.9
1927	13,515	11,743	25,258	6.4	15,426	1,298	510	19.8	329	23.3	3,984	125	56.7
N. Y., New H. & Hart..1928	17,041	16,890	33,931	8.0	21,294	1,636	656	21.3	339	23.7	5,393	112	55.0
1927	23,100	18,501	41,601	17.4	18,762	1,461	579	20.2	264	19.0	5,131	122	57.2
Great Lakes Region:													
Delaware & Hudson.....1928	9,945	5,294	15,239	3.4	22,475	1,881	874	28.3	611	34.1	10,639	139	57.0
1927	9,974	6,031	16,005	3.8	22,877	1,897	920	29.4	660	34.3	12,062	150	61.6
Del., Lack. & Western...1928	17,754	7,316	25,070	4.2	23,019	1,854	774	23.7	563	35.9	14,133	144	75.2
1927	17,658	8,668	26,326	3.0	22,200	1,817	775	24.0	581	35.9	15,315	140	80.2
Erie (inc. Chi. & Erie)..1928	31,297	18,164	49,461	5.8	29,466	2,522	1,034	24.1	605	39.6	12,925	125	64.5
1927	34,870	20,801	55,671	7.6	25,990	2,257	953	24.8	517	32.4	12,420	129	57.1
Lehigh Valley 1928	23,591	8,769	32,360	8.7	25,400	1,886	792	24.5	426	27.1	10,238	154	49.5
1927	23,237	8,947	32,184	9.3	25,536	1,845	805	25.4	481	29.2	11,511	146	53.7
Michigan Central 1928	18,951	15,039	33,990	4.7	30,764	1,915	643	18.6	360	32.0	6,709	115	73.6
1927	16,840	17,911	34,751	4.1	28,426	1,868	641	19.2	355	30.3	6,771	116	67.0
New York Central.....1928	73,612	68,708	142,320	5.2	30,903	2,318	943	24.1	433	29.1	9,537	110	55.5
1927	70,279	71,026	141,305	3.5	29,333	2,347	988	24.9	455	29.0	9,934	111	54.4
New York, Chi. & St. L..1928	14,387	10,096	24,483	7.4	26,382	1,857	683	20.7	580	45.1	8,528	111	73.3
1927	13,162	9,847	23,009	5.5	24,568	1,754	658	20.2	582	44.0	8,044	111	71.1
Pere Marquette.....1928	10,173	7,804	17,977	4.2	20,114	1,557	638	23.3	493	33.2	4,062	105	64.6
1927	10,906	8,793	19,699	3.1	18,512	1,514	619	23.5	459	31.0	4,145	107	67.5
Pitts. & Lake Erie.....1928	17,317	6,224	23,541	5.4	31,834	2,850	1,558	44.2	244	9.3	24,832	112	52.8
1927	13,646	7,450	21,096	5.8	31,032	2,823	1,591	43.5	296	10.9	26,968	108	55.0
Wabash 1928	15,941	10,725	26,666	3.4	28,610	1,703	597	18.7	577	46.8	6,161	125	74.8
1927	15,071	11,620	26,691	2.8	25,978	1,661	578	19.1	519	42.5	5,548	134	66.2
Central Eastern Region:													
Baltimore & Ohio.....1928	75,628	29,150	104,778	4.9	22,616	1,943	893	29.7	512	27.8	9,700	150	60.4
1927	73,064	34,265	107,329	3.9	21,111	1,929	916	31.4	563	29.0	10,905	154	65.3
Central of New Jersey...1928	18,950	10,229	29,179	7.1	22,089	2,011	950	31.2	280	15.2	11,830	144	50.9
1927	18,182	11,163	29,345	5.6	19,318	2,007	953	31.2	287	15.5	12,177	156	50.6
Chicago & Eastern Ill...1928	13,368	3,645	17,013	28.4	23,025	1,576	675	25.5	283	17.7	5,100	142	43.0
1927	13,798	4,667	18,465	20.7	21,071	1,546	672	26.1	297	18.2	5,804	148	49.0
Clev., Cin., Chi. & St. L.1928	23,512	18,903	42,415	3.9	26,791	2,002	893	28.0	480	27.8	8,592	125	55.1
1927	18,388	20,699	39,087	5.6	26,033	1,991	888	28.7	554	32.0	9,117	123	61.3
Elgin, Joliet & Eastern...1928	9,446	7,323	16,769	4.7	15,313	2,108	1,077	37.6	287	12.1	10,464	136	55.1
1927	8,997	7,674	16,671	5.1	14,777	2,153	1,115	39.8	290	11.7	10,487	137	52.5
Long Island 1928	1,628	4,454	6,082	1.7	5,091	851	340	26.7	94	6.3	1,450	262	31.2
1927	1,739	5,784	7,523	1.3	4,740	901	368	27.7	80	5.3	1,522	287	39.0
Pennsylvania System 1928	224,521	75,375	299,896	6.5	25,800	2,216	998	28.7	415	22.5	11,475	133	47.6
1927	216,208	79,703	295,911	4.8	22,122	1,976	901	29.2	442	23.6	12,056	129	51.9
Reading 1928	29,101	11,569	40,670	5.3	22,223	2,016	1,004	34.8	465	22.2	16,740	159	58.8
1927	27,148	14,539	41,687	2.4	21,173	1,916	974	35.2	501	23.4	18,489	153	65.7
Pocahontas Region:													
Chesapeake & Ohio.....1928	33,743	8,204	41,947	2.6	32,701	2,580	1,373	42.3	1,109	46.3	17,110	96	59.0
1927	28,035	13,397	41,432	2.9	30,096	2,689	1,447	43.2	1,342	54.9	20,977	94	67.0
Norfolk & Western.....1928	31,322	8,046	39,368	1.3	39,189	2,907	1,533	41.4	964	38.3	17,010	134	53.2
1927	28,077	8,897	36,974	1.6	38,369	2,880	1,550	43.7	1,177	44.7	19,503	137	58.6
Southern Region:													
Atlantic Coast Line.....1928	23,453	10,502	33,955	6.0	20,069	1,449	531	20.5	363	29.5	2,413	113	49.1
1927	22,959	13,100	36,059	3.8	20,008	1,537	555	20.4	441	36.7	3,156	112	61.0
Central of Georgia.....1928	5,196	4,721	9,917	4.9	18,441	1,324	544	22.2	488	31.9	2,552	141	54.9
1927	5,003	5,696	10,699	3.9	18,733	1,328	578	23.6	551	33.1	3,120	135	64.7
Ill. C. (inc. Y. & M. V.).1928	44,426	21,170	65,596	7.2	24,335	1,731	705	26.4	685	42.6	6,814	127	75.8
1927	42,979	24,725	67,704	5.5	21,982	1,699	714	26.7	673	40.2	6,919	129	73.1
Louisville & Nashville...1928	44,675	16,618	61,293	8.4	17,979	1,431	675	32.3	586	30.6	7,102	151	81.0
1927	44,008	20,679	64,687	8.1	17,014	1,446	688	33.0	643	33.1	8,233	148	89.9
Seaboard Air Line.....1928	15,803	10,918	26,721	6.2	18,424	1,481	537	21.1	383	30.0	2,280	138	59.6
1927	15,028	10,678	25,706	4.3	17,425	1,470	548	22.1	454	34.1	2,753	135	73.8
Southern 1928	46,420	21,245	67,665	6.9	18,868	1,422	563	22.6	404	28.6	4,072	162	53.9
1927	44,565	21,017	65,582	4.6	18,285	1,377	554	22.6	453	31.2	4,418	158	58.8
Northwestern Region:													
Chi. & North Western...1928	46,717	25,519	72,236	7.7	18,292	1,407	540	22.0	332	24.1	2,837	139	51.4
1927	51,218	26,699	77,917	6.6	16,966	1,373	553	22.0	294	20.0	2,705	142	49.6
Chi., Mil., St. P. & Pac..1928	48,617	20,793	69,410	3.4	22,511	1,742	716	23.2	507	33.3	3,130	135	57.7
1927	53,844	19,874	73,718	5.4	20,429	1,640	677	22.7	440	29.3	2,897	142	55.0
Chi., St. P., Minn. & Om.1928	2,164	8,099	10,263	7.4	14,788	1,151	460	21.9	426	29.7	2,537	129	58.4
1927	3,235	8,121	11,356	10.4	14,004	1,119	459	21.5	369	24.9	2,432	134	50.9
Great Northern 1928	40,695	9,455	50,150	6.9	23,508	2,001	890	25.1	421	24.4	2,585	141	39.4
1927	41,028	7,624	48,652	5.3	23,767	2,016	921	25.8	444	25.2	2,645	133	35.6
Minn., St. P. & S. Ste. M..1928	19,481	5,378	24,859	5.8	16,475	1,406	599	22.4	388	25.5	2,200	110	64.0
1927	19,506	5,323	24,829	4.0	15,923	1,381	588	22.6	373	24.8	2,108	112	50.0
Northern Pacific 1928	37,549	7,025	44,574	8.5	25,102	1,918	857	24.2	481	27.8	3,345	149	49.9
1927	37,840	7,019	44,859	7.6	23,375	1,846	821	24.1	455	26.7	3,143	143	43.5
Oreg.-Wash. R. R. & Nav.1928	8,159	3,202	11,361	6.8	21,572	1,736	780	25.7	417	23.1	2,111	175	48.9
1927	7,360	3,819	11,179	5.0	20,770	1,655	750	24.7	401	21.9	2,072	177	44.3
Central Western Region:													
Atch., Top. & S. Fe (in- 1928	59,709	15,198	74,907	6.0	28,617	1,913	689	21.0	478	35.1	3,442	114	65.1
cluding P. & S. F.)...1927	58,123	18,103	76,226	6.0	26,197	1,877	681	21.1	498	36.1	3,657	115	69.6
Chicago & Alton.....1928	10,486	3,941	14,427	3.3	22,106	1,454	550	22.5	337	24.6	4,864	156	63.0
1927	10,343	4,727	15,070	3.3	17,944	1,360	497	22.4	289	22.2	4,282	173	60.6
Chi., Burl. & Quincy....1928	47,989	18,915	66,904	4.5	23,581	1,747	764	24.3	507	31.9	3,636	132	52.7
1927	51,029	17,123	68,152	3.9	21,179	1,621	697	24.0	443	28.8	3,233	142	50.8
Chi., Rock I. & Pacific..1928	31,049	17,511	48,560	7.2	20,258	1,493	552	22.2	596	38.7	3,245	144	68.2
1927	33,175	21,113	54,288	7.0	17,321	1,390	517	21.6	431	32.9	3,093	146	71.4
Denver & R. G. Wn....1928	12,248	2,832	15,080	3.2	20,267	1,849	877	28.2	378	19.5	2,236	176	32.0
1927	11,795	2,769	14,564	2.5	17,953	1,706	810	27.1	358	18.6	2,055	179	32.9
Oregon Short Line.....1928	8,695	4,589	13,284	3.6	25,031	1,800	798	25.7	560	30.7	2,931	117	59.0
1927	8,106	5,381	13,487	3.9	23,359	1,716	778	25.6	479	25.7	2,546	121	48.2
Southern Pac.--Pac. Lines.1928	38,073	26,323	64,396	5.6	24,712	1,906	679	22.4	524	39.2	3,856	120	65.3
1927	35,121	28,399	63,520	5.0	23,152	1,868	698	23.1	538	37.5	3,921	124	64.4
Union Pacific 1928	20,858	9,498	30,356	10.3	36,326	2,151	825	20.9	838	57.9	6,857	110	71.6
1927	21,990	8,182	30,172	14.9	34,269	2,097	858	20.8	698	43.9	5,672	110	52.7
Southwestern Region:													
Gulf, Colo. & S. Fe.....1928	10,037	3,928	13,965	3.7	28,338	1,903	817	26.0	525	31.5	3,796	101	61.2
1927	9,594	6,750	16,344	3.3	25,533	1,844	784	27.6	582	35.6	4,918	104	77.4
Mo.-Kans.-Tex. Lines.....1928	16,711	6,425	23,136	6.7	28,539	1,993	732	22.1	425	33.4	3,099	100	58.6
1927	15,857	7,236	23,093	6.5	26,027	1,956	707	22.1	471	37.5	3,426	102	63.3
Missouri Pacific 1928	29,743	19,530	49,273	5.1	24,817	1,764	730	24.2	632	40.2	4,191	126	72.8
1927	29,426	21,181	50,607	3.9	19,069	1,576	654	23.4	512	32.8	3,542	132	71.2
St. Louis-San Francisco..1928	22,516	8,721	31,237	3.7	19,532	1,442	572	23.8	464	32.6	2,910	154	59.2
1927	21,529	10,639	32,168	3.5	18,276	1,441	582	24.1	469	31.6	3,101	154	59.1
Texas & New Orleans...1928	12,075	14,315	26,390	5.8	18,261	1,221	469	22.4	471	33.2	2,641	107	78.3
1927	11,496	15,234	26,730	5.6	18,148	1,260	509	23.7	501	33.0	2,932	108	82.7
Texas & Pacific.....1928	6,480	11,317	17,797	4.3	20,526	1,752	671	25.8	687	47.4	6,072	110	86.8
1927	6,016	6,491	12,507	3.9	21,466	1,651	598	22.4	628	46.8	4,020	107	75.0

News of the Week

(*Continued from page 1457*)

two night and two day trains. The new trains will leave New York at 9:45 and Montreal at 10 o'clock.

Enginemen On Western Roads Get 6½ Per Cent Advance

The western railways, through their conference committee of managers, on June 19, at Chicago, completed an agreement with the Brotherhood of Locomotive Engineers, granting an advance of 6½ per cent in the pay of enginemen on 45 railroad systems, comprising 89 separate railroads. W. M. Jeffers, general manager of the Union Pacific and chairman of the conference committee, signed the agreement for the railroads and A. Johnston, grand chief engineer of the brotherhood, for the employees.

All the arbitraries and special allowances, including the minimum daily guarantee in passenger train service, are also increased 6½ per cent; while the differentials in local freight train rates over the through freight train rates and the differentials for mountain or desert territory are to remain as under the existing schedules. The weight on all trucks equipped with boosters will be added to the weight on drivers in calculating the weights for the respective classes of service. This wage agreement is retroactive to May 1, 1928, and will continue in force for one year; thereafter to be changeable on 30 days' notice.

This action supersedes the agreement of May 21 to arbitrate the employees' demand for 15 per cent. It is estimated that the award will add about $4,500,000 to the annual payrolls of the railroads and will affect the pay of 22,500 enginemen.

I. C. C. Declines to Require Through Routes Via Hell Gate Route

On the complaint of the Port of New York Authority, asking the Interstate Commerce Commission to require the establishment of through routes and joint rates by way of the Hell Gate bridge between Long Island points and points west of New York and Pennsylvania, the commission held, in a decision made public on June 20, that to require such through routes and joint rates on outbound traffic from Long Island would short-haul the Long Island and the Pennsylvania, carriers operated in conjunction and under common management and control, contrary to the provisions of Section 15 (4) of the interstate commerce act, and upon the present record, the requirement of such routes and rates on inbound traffic to Long Island points was not found to be in the public interest. A motion by the defendant railroads to dismiss an amendment to the complaint alleging undue preference of interstate commerce and undue prejudice of intrastate commerce was granted on the ground that it is not within the purview of the interstate commerce act. The carriers were, however, admonished to publish an alternate routing clause in their tariffs to enable the use of the Hell Gate route in times of emergency or serious congestion.

The commission, in the report by Commissioner Aitchison, held that the Long-Island-Pennsylvania routes to the destination territory are not unreasonably long and that in the handling of traffic inbound the Pennsylvania, in the absence of undue prejudice, has the right under the law to the long haul on all traffic that originates on its lines or that comes to its possession from its connections.

Supply Men Exhibit at Superintendents Convention

This year is the first time in which an exhibition of railway supplies and equipment has been presented in connection with the annual meeting of the American Association of Railroad Superintendents. The supply association is known as the Railway Equipment Exhibit Association. With the retirement of J. Will Johnson, Pyle-National Company, Chicago, as chairman, at the conclusion of the convention the following officers were advanced to serve for the ensuing year:—Chairman, C. M. Hoffman, Dearborn Chemical Company, Chicago; president, J. W. Fogg, McLean-Fogg Lock Nut Company, Chicago; first vice-president, J. J. Cizek, Leslie Company, Lyndhurst, N. J.; second vice-president, Joseph Sinkler, Pilot Packing Company, Chicago, third vice-president, M. K. Tate, Lima Locomotive Works, Lima, Ohio; fourth-vice-president, R. F. Duysters, Simmons-Boardman Publishing Company, New York City; secretary-treasurer, F. W. Venton, Crane Company, Chicago.

The following members were elected to serve on the executive committees: S. A. Witt, Detroit Lubricator Company, Chicago; W. C. Walsh, American Steel Foundries, Chicago; Richard Welsh, Nathan Manufacturing Company, Chicago; F. R. Roesch, Standard Stoker Company, New York City; W. C. Sanders, Timken Roller Bearing Company, Chicago; Sidney Johnson, General Railway Signal Company, New York City; H. W. Griffin, Union Switch & Signal Company, New York City; and Bard Brown, Superheater Company, New York City.

The firms participating in the exhibit, together with the names of their representatives and the nature of their exhibits follow:—

American Arch Company, New York.—Literature. Represented by W. E. Salisbury.

American Steel Foundries, Chicago—Rotary uncoupling device, standard D type coupler and photographs. Model of increased spring capacity freight car truck. Represented by W. C. Walsh and C. E. Grigsby.

Baker-Raulang Company, Cleveland, Ohio.—Electric transfer truck. Represented by B. C. Hooper.

Brill Company, J. G., Philadelphia, Pa.

Carson Railway Safety Gate Company, Memphis, Tenn.—Model of safety gate. Represented by E. W. Hamm.

Clark Manufacturing Company, Philadelphia, Pa.—Represented by H. J. Smith.

Crane Company, Chicago.—Plumbing fixtures for passenger equipment. Represented by F. W. Venton, J. B. Jordan, and J. D. Murphy.

Dearborn Chemical Company, Chicago.—Feedwater treatment, water treating plants, rust preventive. Represented by C. M. Hoffman, R. Q. Milnes, F. B. Horstmann, and S. E. Moore.

Detroit Lubricator Company, Detroit, Mich.—Mechanical lubricators, bulls-eye lubricator and transfer filler, flange oiler. Represented by S. A. Witt.

Durametallic Corporation, Chicago.—Full line of flexible metallic packing, grade D railway packing. Represented by J. M. Bandish.

Estate Stove Company, Hamilton, Ohio.—Station and caboose stoves. Represented by W. P. Whitfield.

Franklin Railway Supply Company, New York.—Moving pictures of locomotive booster and literature. Represented by W. T. Lane, S. G. Rosenfelt, and T. P. Whelan.

General Railway Signal Company, New York.—Dispatching system. Represented by H. W. Lucia, J. R. Wills, A. G. Moore and S. G. Johnson.

Grip Nut Company, Chicago.

Leslie Company, Lyndhurst, N. J.

Lima Locomotive Works, Inc., Lima, Ohio.—Model of A. 1 locomotive. Represented by M. K. Tate.

Locomotive Firebox Company, Chicago.—Motion picture of locomotive firebox. Represented by E. Frank Smith and L. R. Pyle.

Long, Charles R. Jr., Company, Chicago.—Paints and varnish. Represented by John S. Lemley.

Lunkenheimer Company, Cincinnati, Ohio.—Valves and other appliances for railroad service. Represented by H. J. Evans.

Maney Guard Rail Company, Louisville, Ky.—Guard rail fastenings. Represented by W. T. O'Neill.

McLean-Fogg Lock Nut Company, Chicago.

Mercury Manufacturing Company, Chicago.—Represented by H. B. Clapp.

Miner, W. H. Co., Inc., Chicago.—Handbrakes, side bearings, safety bolster center locking pins, draft gears. Represented by R. J. Miner and B. S. Johnson.

Nathan Manufacturing Company, Chicago.—Mechanical lubricator. Represented by Richard Welsh, W. A. Barr, and T. J. Murphy.

National Boiler Washing Company, Chicago.—Represented by F. W. Gale.

Norton Manufacturing Company, Memphis, Tenn.—Packing cutter and multiple tie plugs. Represented by F. K. Norton.

Oxweld Railroad Service Corporation, Chicago.—Oxygen and acetylene, regulators, model B cutting blow pipe, double heating blow pipe, welding blow pipes, cutting nozzles and welding heads. Represented by B. C. Beckett.

Pettibone Mulliken Company, Chicago.—Represented by G. J. Slibeck.

Pilot Packing Company, Chicago.—Packing. Represented by J. Sinkler.

Pyle-National Company, Chicago.—Full line of conduit fittings, safety-first switches, vapor proof lamps, locomotive marker lamps, plugs and receptacles, electric hand lanterns, turbo-generators and full line of flood lights. Represented by J. Will Johnson and R. L. Kilken.

Re-Bo Company, Watertown, N. Y.

Ridge Tool Company, Elyria, Ohio.—Pipe wrenches. Represented by P. Clutterbuck.

Sheafe Engineering Company, Chicago.—Bronze bushed, air hose coupling, air pump valves. Represented by Ralph Sheafe.

Sherman Hotel, Chicago.

Simmons-Boardman Publishing Company, New York City.—Magazines. Represented by Elmer T. Howson and R. F. Duysters.

S. K. F. Industries Company, New York City.—Railway Journal application, size 5 by 9. Represented by M. S. McNay.

Speed Up Railway Supply Company, Paducah, Ky.—Stay-bolt chucks and car rerailers. Represented by W. H. Wilson.

Standard Oil Company of Louisiana, New Orleans, La.—Literature. Represented by W. H. Booth, and H. Bonham.

Standard Stoker Company, Chicago.—Two stoker models, scene in action. Represented by R. J. Schlacks, E. T. Schroeder, F. P. Roesch, A. E. Patterson, C. T. Hansen, W. P. Chenault and H. S. Mann.

Superheater Company, New York City.

Timken Roller Bearing Service & Sales Co., Chicago.—Tapered roller bearing for railway equipment. Represented by H. N. Brandon and W. C. Sanders.

Union Metal Products Company.

Union Switch & Signal Company, Swissville, Pa.—Dispatcher control system. Cab signaling. Represented by H. W. Griffin, J. S. Hobson, S. S. Turreff, C. G. Harwig, R. L. Hermann, J. R. Mickley, W. B. Rudd.

Universal Packing & Service Company, Chicago.—Journal packing. Represented by W. M. Gibbs and L. A. Rowe.

Ward Love Pump Corporation, Rockford, Ill.—Model of Duplex 84 water softening plant. Represented by R. P. Moscrip.

Worthington Pump & Machine Company, Chicago.—Locomotive feedwater heater. Represented by W. N. Agnew, J. M. Lammedee and F. F. Murray.

The meeting was held at the Peabody Hotel, Memphis, Tenn., June 13.

Traffic

The Interstate Commerce Commission has issued a supplemental report on reconsideration of its Southeastern Sugar Investigation proceeding, making several modifications of its findings as to sugar rates to, from and in the Southeast.

The extension of the Atlantic Coast Line from Immokalee, Fla., southward to Everglades, 41 miles, was opened for business on June 14; and it is expected regular through trains will be put in service about July 1.

The Secretary of War has announced that agreements providing for joint rates, routes and divisions with the barge line of the Inland Waterways Corporation have been entered into between the barge line and the Chicago & North Western and the St. Louis-San Francisco.

The Interstate Commerce Commission has re-opened the Baltimore port differential case for further hearing, in order that Boston interests may offer additional testimony and has assigned the proceeding for hearing on July 16 at Boston before Attorney-Examiner Trezise.

The first carload of dates to originate in the United States was recently shipped over the Southern Pacific from Indio, Cal., to New York, a refrigerator car carrying 26,000 lb. of iced Deglet Noor dates. Although dates have been grown in California for many years, not until recently have they been grown successfully on a large commercial scale.

A total of 24,000 persons above the normal movement, entered Kansas City, Mo., on June 11 and 12 to attend the National Republic Convention. This increase in railroad traffic required a total of 800 additional cars which comprised 17 special trains, 7 private cars, 30 railroad business cars and extra cars on regular trains.

The Soo Line announces the establishment of through sleeping car service on the Atlantic Limited from Minneapolis and St. Paul to Ottawa, Montreal, Quebec, Portland and Boston, the route being over the Canadian Pacific from Sault Ste. Marie to Quebec, thence by the Maine Central to Portland, and the Boston & Maine to Boston. The time through, each way, is about forty-eight hours.

At the sixth annual meeting of the Associated Traffic Clubs of America held at San Francisco, Cal., on June 12 and 13, William C. Fitch, freight claim agent of the Southern Pacific was elected president. Other officers included: first vice-president, T. B. Curtis, general agent of the Charleston & Western Carolina, Atlanta, Ga., second vice-president W. H. Roe, traffic manager of the Mid-continent Petroleum Corporation, Tulsa, Okla., and third vice-president P. R. Flanagan, assistant general freight agent of the Chicago Great Western, Chicago.

A "touch of the Oriental" has been added to the sleeping car service of the Southern Pacific, according to a recent announcement. On the night expresses, numbers 75 and 76, between San Francisco and Los Angeles, "three winsome Oriental maidens" have been appointed to serve passengers. They are (Americanized) Misses Virginia Tong, Barbara Young and Dorothy Pon. These are not the only Chinese in the Pullman service; Chinese attendants have been in service for some time on Pullman club cars between San Francisco and Chicago.

Southwest Shippers' Board

At the meeting of the Southwest Shippers' Advisory Board, held at Enid, Okla., on June 7, estimates presented by commodity committees of prospective carload shipments for the third quarter of the current year, compared with the corresponding period of 1927, reflected a general increase. The estimates of the wheat crop varied more or less, but the consensus of opinion of producers and dealers pointed to an increased yield in Oklahoma, Texas, Kansas, Nebraska, Colorado and New Mexico. Considerable discussion was given to the practice of some combine operators of cutting the grain before it is thoroughly ripe and also following rains or before the dew is off, which invariably results in heavy moisture content, thereby greatly increasing the hazard of heating in transit. In order to reduce as far as possible the number of cars needed, shippers were urged to load all cars to limit capacity. It was voted to hold the September meeting at Dallas, Tex.

Depreciation Order Modified By I. C. C.

The Interstate Commerce Commission has modified its Order in No. 15,100, Depreciation Charges of Steam Railroad Companies, by eliminating all reference to the latest date upon which operating steam railroad companies shall file with the commission their estimates of composite percentage rates for use in depreciation accounting. Incident to the reopening of the proceeding for further hearing the railroads requested that further consideration be given to the manner in which the percentages shall be determined; and the commission in its modifying order says that under the circumstances the computation of such percentage rates may properly be deferred until the commission shall have entered its final order and set a new date for the submission of such data.

Freight Rates and Lumber Prices

Freight rates are not responsible for fluctuations that have taken place in the past three years in prices of lumber, such fluctuations having been usually more than the freight rates. This is shown in a study just completed by the Bureau of Railway Economics.

"Mill prices of lumber," says the Bureau, "fluctuated irregularly from month to month throughout the entire period studied. On rare occasions did the average price remain unchanged for two consecutive months. The monthly fluctuations varied from a few cents to several dollars per thousand board feet on each size in every grade. These spreads were in many instances several times the freight rates on a thousand feet of lumber even from the most distant milling point from which the various markets obtained lumber.

"Retail prices of lumber also fluctuated at irregular intervals during the three years in all of the markets. While the same prices often prevailed in a given market for many months, at other times the period of stationary prices was of short duration.

"The changes were usually abrupt and in most instances of a relatively large amount.

"On the other hand, freight rates on lumber remained substantially the same throughout the price period."

Reduced Lake Cargo Rates in Effect

The new tariffs filed by the railroads serving the Pennsylvania and Ohio coal districts, reducing the rates on "lake cargo" coal to the lake ports from $1.46 to $1.26 from the Pittsburgh district and from $1.43 to $1.23 from the Ohio No. 8 and Cambridge districts, became effective on June 18, after the Interstate Commerce Commission had refused on June 12 to suspend the tariffs, except that the full amount of the reduction was not allowed to become effective as to the Baltimore & Ohio for ten days.

The Baltimore & Ohio was authorized by the commission on June 16 to publish on ten days' notice tariffs corresponding to those of the other roads. The Baltimore & Ohio had filed a tariff proposing only a 10-cent reduction, in line with its previous efforts to bring about a compromise on a 35-cent differential between the rates from the northern and the southern districts. After the commission had declined to suspend the 20-cent reduction, as it had been asked to do by railroads and operators of the southern district, the Baltimore & Ohio asked authority to establish a 20-cent reduction on one day's notice, which was denied by the commission, on June 13. Later it asked for permission to file tariffs on 10 days' notice. The commission on June 14 also denied applications of the Bessemer & Lake Erie, the Pittsburgh & West Virginia and the Western Maryland for authority to file tariffs on one day's notice bringing their rates into line with those of other northern roads.

In reply to protests by the southern roads and operators the northern lines filed with the commission a statement regarding their action, denying that any rate war had been initiated by them. They said that "if a rate war has been started it was initiated by the action of the southern railroads in reducing their rates, 20 cents a ton, to become effective August 28, 1927, to follow down the reduction in the northern rates ordered by the commission. The proposed reduction in the northern rates is intended

to restore, for this season, the differential relationship established by the commission's order, and is in no sense the initiation of a rate war."

Hoch-Smith Investigation

Further testimony in the investigation of rates on grain and grain products which the Interstate Commerce Commission has been conducting during the past 35 weeks at various points in the United States is being taken at Seattle, Wash. Witnesses at this hearing, which opened on May 24, stated that grain growers get lower prices in the differential territory due to a lack of carrier competition; that the concentration of the grain movement at Portland has resulted in congestion of traffic and delays; that uneconomic empty car movements from the Snake River territory to Puget Sound, and from Portland to Puget Sound have been caused by a differential which gives Portland a 10 per cent advantage in rates over Seattle; that the differential encourages milling abroad; and that the Northern Pacific is willing to meet the lower Portland rates if allowed to do so by the commission.

The Idaho Public Utilities Commission favored lower rates from southern Idaho to Pacific ports, such rates to be based and graduated on distance. This would increase the present differential in favor of Portland as compared with Seattle. The carriers showed that the differential is an economic injustice to the railroads. M. G. Crawford, assistant general superintendent of transportation of the Northern Pacific testified that that road hauled thousands of empty box cars through the wheat belt, although they were suitable for grain, without picking up any traffic from the differential zone from which the farmers ship millions of bushels of wheat to Portland. This condition exists because they can save 10 per cent on freight costs by using the water level route down the Columbia river instead of the haul over the Cascades to Seattle.

In the year ending on June 30, 1927, the Northern Pacific moved 16,274 empty cars to Pasco without receiving any wheat for Seattle.

J. D. Morrison, general freight agent of the Northern Pacific, favored the elimination of the differential by raising the Portland rates 5 per cent and lowering the Seattle rates by 5 per cent but conceded that if necessary the Northern Pacific would be inclined to reduce the Seattle rates to a reasonably fixed Portland level in order to obtain some wheat business from the Snake river country. Such a reduction would be justified by the prospect of obtaining some wheat cargo at Pasco for box cars that are now hauled empty over the mountains to Puget Sound.

Shippers entered a complaint that Canadian competition is threatening to curtail wheat production in Washington, Oregon and Idaho due to the lower rates in effect but the carriers filed an objection on the grounds that Canadian conditions had no bearing on freight rates in the United States.

Equipment and Supplies

Locomotives

THE CANADIAN NATIONAL is inquiring for 8 to 10 2-10-4 type locomotives for service on the Central Vermont.

Freight Cars

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has ordered 250 single deck stock cars from the Pullman Car & Manufacturing Corporation.

THE MISSOURI-KANSAS-TEXAS has ordered 10 dump cars from the Western Wheeled Scraper Company.

THE ERIE has ordered 500 steel box cars of 40 ton capacity from the Pressed Steel Car Co., and 400 steel automobile cars of similar capacity from the Standard Steel Car Co. Inquiry for this equipment was reported in the *Railway Age* of April 28.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has placed orders with the General Railway Signal Company covering materials for automatic block signals at Schiller Park, Ill. The order includes five type S color-light signals, four dwarf signals, and other material.

Signaling

THE PENNSYLVANIA has ordered from the Union Switch & Signal Company materials for an electro-pneumatic interlocking at Knightsville, Ind., and for another at EY Tower, Terre Haute, Ind.

THE CHESAPEAKE & OHIO has ordered from the Union Switch & Signal Company materials for an electro-pneumatic interlocking at KC Junction, Covington, Ky. The machine will have 59 levers and color-light signals will be used.

THE OREGON SHORT LINE has ordered from the Union Switch & Signal Company 72 color-light signals, 57 copper oxide rectifiers and other apparatus for automatic block signaling between Idaho Falls, Idaho, and Fort Hall; 37 miles, single track.

THE PACIFIC ELECTRIC RAILWAY has ordered from the Union Switch & Signal Company 42 color-light signals, 82 impedance bonds, 37 switch indicators and other apparatus preparatory to installing automatic block signals on its lines between Vineyard and Sherman Junction, Rivas and Glendora and Los Nogales and Rio Vista.

Supply Trade

The Bucyrus-Erie Company, South Milwaukee, Wis., plans the construction of a two-story 65 ft. by 180 ft. pattern shop addition and storage vault.

The O'Fallon Company, Telephone building, St. Louis, Mo., have been appointed Southwestern railroad representatives of the **Prime Manufacturing Company,** Milwaukee, Wis.

W. J. Stanton, who has been associated with the **Ohio Brass Company** for the past eight years, has resigned to open a manufacturers' agency at 120 Broadway, New York.

The Electro Chemical Engineering Corporation, Chicago, has been organized to manufacture water softening and treating plants. **L. O. Gunderson,** formerly chemical engineer of the Chicago & Alton, has been elected president.

George A. Gothberg has been appointed manager of railway sales, with office at 10 North Fox street, Chicago, of the **General Fireproofing Company,** Youngstown, Ohio, succeeding E. L. Lefler, resigned.

F. C. Allen, Jr., the founder and former president of **Allen & Billmyre Company, Inc.,** has severed his connection with that organization to become president of the Allen Air Appliance Company, Inc., Glen Falls, N. Y., with headquarters at Grand Central Terminal Building, New York.

The Manning Abrasive Company, Inc., Troy, N. Y., and **Herman Behr & Company, Inc.,** Brooklyn, N. Y., manufacturers of sandpaper and general coated abrasive products, have been consolidated under the name of the **Behr-Manning Corporation.** The factories in Brooklyn and in Troy will be continued in operation as heretofore.

E. H. Weitzel, vice-president of the **Colorado Fuel & Iron Company,** has resigned effective July 1. His advice will still be available to the company although he will not be in active service. Mr. Weitzel entered the employ of the Colorado Fuel & Iron Company in August, 1907, as chief engineer of the fuel department, in charge of the coal mines. On May 1, 1908, he became manager of that department, which position he held until March, 1922, when he was promoted to general manager of the company. Later he was elected vice-president and in May, 1927, also took over the control of the subsidiary companies. The duties which Mr. Weitzel has performed as vice-president will be distributed between the different departments without the appointment of a new vice-president to succeed him.

Construction

BANGOR & AROOSTOOK. — Bids were closed by this company on June 15 for the construction of two coal pockets of 150 and 50 ton capacities at Northern Maine Junction, Me.

BALTIMORE & OHIO.—This company has awarded a contract to J. M. Cain, Baltimore, Md., for the construction of water treating plants at Point of Rocks and Brunswick, Md. The estimated cost of these facilities is approximately $62,000. A contract has also been awarded to Bates & Rogers Construction Co., Cleveland, O., for the reconstruction of four bridges on the Ohio river branch. This work is expected to cost about $52,000.

CANADIAN NATIONAL.—This road plans the elimination of a grade crossing on its line near North Sydney, N. S. The project is expected to cost about $27,500.

CANTON & CARTHAGE.—This company has applied to the Interstate Commerce Commission for authority to build and operate a line from Canton to Carthage, Miss., including 11 miles of track already built by the Pearl River Valley Lumber Company.

CHESAPEAKE & OHIO.—A contract for the construction of an addition to the yard of this company at Martin, Ky., has been let to T. C. Staples. With the construction of a water tank, coaling station and similar facilities the cost of the improvement is estimated at $60,000.

CHICAGO, ROCK ISLAND & PACIFIC.—A contract for the construction of a reinforced concrete and brick commissary building at Fifty-first street, Chicago, to replace a similar structure which was destroyed by fire, has been let to Dwight P. Robinson & Co., Inc., New York, at a cost of about $200,000. The same company has been awarded a contract for the construction of a brick and steel car shop at Burr Oak, Chicago, at a cost of about $200,000.

DENVER & RIO GRANDE WESTERN. — Company forces will be employed in the construction of additional yard facilities at Pueblo, Colo., at a cost of approximately $19,000.

GRAND TRUNK WESTERN.—A contract for the construction of additions and alterations to the 48-stall enginehouse at Durand, Mich., has been awarded to the Davis-Stuntz Company, Detroit, Mich.

ILLINOIS CENTRAL.—This company plans to enlarge its grain elevator at Omaha, Neb., by the addition of storage space for 1,000,000 bu. of grain.

MAYSVILLE BRIDGE COMPANY.—The owners of this company plan the construction of a railroad between Dayton, Ohio, and Maysville, Ky., about 90 miles, to serve a coal region. Permission has been obtained for the construction of a bridge across the Ohio river at Aberdeen, Ohio, and it is planned to apply to the Interstate Commerce Commission for permission for construction immediately.

MONONGAHELA (Chartiers Southern).—A contract has been awarded to A. Guthrie & Co., Inc., St. Paul, Minn., for the construction of an extension from Waynesburg, Pa., to Mather, 7 miles. This project will involve the excavation of 500,000 cu. yd. of material, most of which is rock, and the driving of a 1000-ft. tunnel. The cost of this portion of the work, which includes grading and the construction of culverts and the concrete substructures for bridges, will be about $750,000.

OHIO RIVER & CUMBERLAND.—This company, which has been organized to acquire the Eastern Kentucky, plans the construction of an extension of that railroad from Grayson, Ky., to a connection with the Ohio & Kentucky at a point near West Liberty, about 35 miles.

PENNSYLVANIA.—A contract for grading and masonry work in connection with line changes and bridge reconstructions, west of Carnegie, Pa., has been awarded by this road to Ferguson & Edmonds, Pittsburgh, Pa. The project is expected to cost approximately $150,000. This company also let a contract to the Dresser Company, Cleveland, O., for the erection of a new station at Wilson, Pa.

ST. LOUIS-SAN FRANCISCO.—The Cole County circuit court at Jefferson City, Mo., has handed down a decision upholding the order of the Missouri Public Service Commission requiring this railroad, the Sheffield Steel Corporation, the Kansas City Public Service Company, the Missouri Pacific and the Kansas City Southern to share in the cost of construction of a viaduct over their tracks at Winner road, Kansas City, Mo. The City of Kansas City will bear 50 per cent of the total cost of $1,900,000, with the Frisco contributing 12 per cent of the cost, the Kansas City Southern, 12 per cent and the Missouri Pacific, 8 per cent, the Public Service Company, 13 per cent and the Sheffield Steel Corporation, 5 per cent.

TERMINAL RAILROAD ASSOCIATION.—The Board of Public Service of St. Louis, Mo., on June 14 refused to issue the permits sought by this company for the enlargement and improvement of the St. Louis Union station and its facilities. The Board held that these improvements which will cost about $4,000,000 are too extensive to be approved by the city under a construction permit and that the Board of Aldermen should adopt an ordinance inasmuch as the request for the use of certain streets and alleys amounted to permanent vacation.

WESTERN PACIFIC. — The Interstate Commerce Commission has issued a certificate authorizing the Western Pacific to construct an extension of its line from Wells, Nev., to a connection with a branch line of the Oregon Short Line, approximately 6,200 feet.

Financial

ATCHISON, TOPEKA & SANTA FE.—*Acquisition of Orient.* —This company has filed with the Interstate Commerce Commission its application of authority to acquire control of the Kansas City, Mexico & Orient by purchase of all or a majority of its capital stock, stating that it has already acquired subscription rights to 14,561 shares of the total of 35,000 shares of the company but has not exercised any control by reason of such acquisition. The company has entered into a contract with W. T. Kemper, who owns or controls the right to subscribe to 20,354 shares of the stock, to purchase it at $414.50 a share, and states that the English Noteholders' Committee controls 14,455 shares. In the contract Mr. Kemper warrants that the company has in its treasury or among its assets cash or its equivalent, materials and stores to the amount of more than $2,500,000, as an offset against the company's obligation to the United States Government for a loan of $2,500,000 with interest at 6 per cent from December 1, 1927. The application states that the price for the stock represents a value for the physical property of $14,000 a mile.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC. — *Equipment Trust Certificates.* —This company has applied to the Interstate Commerce Commission for authority for the issuance and sale of $8,911,000 of 4½ per cent equipment trust certificates, in four series, to be sold to Halsey, Stuart & Co., Inc., at 97.55 and interest.

CHICAGO, ROCK ISLAND & PACIFIC. — *Abandonment.*—The Interstate Commerce Commission has issued a certificate authorizing the abandonment of operation of the line of the Choctaw, Oklahoma & Gulf from a point near Newport to Jacksonport, Ark., 3.412 miles, but the application for authority to abandon the line was denied.

GREAT NORTHERN PACIFIC. — *Further Hearing Denied.*—The Interstate Commerce Commission has denied a petition of the Chicago Great Western for further hearing on this company's application for authority to acquire control of the Great Northern and Northern Pacific but has authorized it to intervene and be heard on oral argument.

LOUISVILLE & NASHVILLE.—*Abandonment.*—The Interstate Commerce Commerce commission has issued a certificate authorizing the abandonment of part of a branch line from McPhail to Paxton, Ala., 4,154 feet.

NORTHERN PACIFIC.—*Annual Report.*—The annual report of this company is summarized on adjacent advertising pages.

PAJARO VALLEY CONSOLIDATED.—*Abandonment.*—This company, the stock of which is owned by the Spreckels Sugar

(*Continued on page 1465*)

Annual Reports

Thirty-first Annual Report of the Northern Pacific Railway Company

Office of the
NORTHERN PACIFIC RAILWAY COMPANY,
St. Paul, Minnesota, May 22, 1928.

To the Stockholders of the
Northern Pacific Railway Company:

The following, being the thirty-first annual report, shows the result of the operation of your property for the year ending December 31, 1927.

Income Account

	1927	1926	Increase—I Decrease—D	
Average mileage operated.	6,669.95	6,682.35	D	12.40
Operating Income.				
Operating revenues	$95,574,816.28	$97,351,041.96	D	$1,776,225.68
Operating expenses	67,854,738.56	68,260,944.43	D	406,205.87
Net operating revenue	$27,720,077.72	$29,090,097.53	D	$1,370,019.81
Railway tax accruals	8,907,123.66	9,151,146.99	D	244,023.33
Uncollectible railway revenues	20,009.94	20,672.13	D	662.19
Railway operating income	$18,792,944.12	$19,918,278.41	D	$1,125,334.29
Equipment rents—net	1,728,209.39	2,300,954.46	D	572,745.07
Joint facility rent—net	2,071,683.22	1,994,467.62	I	77,215.60
Net railway operating income	$22,592,836.73	$24,213,700.49	D	$1,620,863.76
Nonoperating Income.				
Income from lease of road	$330,513.00	$332,531.21	D	$2,018.21
Miscellaneous rent income	513,618.98	540,694.63	D	27,075.65
Miscellaneous nonoperating physical property	263,130.70	174,799.49	I	88,331.21
Dividend income	9,336,122.00	9,334,739.18	I	1,382.82
Income from funded securities	730,657.77	1,287,673.55	D	557,015.78
Income from unfunded securities and accounts	255,799.00	415,770.79	D	159,971.79
Miscellaneous income	5,222.51	7,366.92	D	2,144.41
Total nonoperating income	$11,435,063.96	$12,093,575.77	D	$658,511.81
Gross income	$34,027,900.69	$36,307,276.26	D	$2,279,375.57
Deductions from Gross Income.				
Rent for leased roads	$51,470.65	$51,320.65	I	$150.00
Miscellaneous rents	76,770.71	49,530.20	I	27,240.51
Miscellaneous tax accruals	219,658.59	36,000.00	I	183,658.59
Interest on funded debt	14,714,082.32	14,774,879.07	D	60,796.75
Interest on unfunded debt	150,501.34	129,427.24	I	21,074.10
Amortization of discount on funded debt	34,963.54	37,218.28	D	2,254.74
Miscellaneous income charges	242,029.76	226,168.76	I	15,861.00
Total deductions from gross income	$15,489,476.91	$15,304,544.20	I	$184,932.71
Net income	$18,538,423.78	$21,002,732.06	D	$2,464,308.28
Dividend requirements	$12,400,000.00	$12,400,000.00		
Balance for the year.	$6,138,423.78	$8,602,732.06	D	$2,464,308.28

Earnings

Freight Business

Freight revenue was $75,462,954.96, a decrease of $763,109.78, or 1.00 per cent.

The number of tons of revenue freight carried was 23,102,319, an increase of 117,793, or 0.51 per cent.

6,571,474,798 tons of revenue freight were moved one mile a decrease of 67,684,719 tons one mile, or 1.02 per cent.

The average revenue per ton mile was 1.148 cents, the same as last year.

The revenue train load increased from 661.87 to 670.22 tons. The total train load, including company freight, increased from 759.00 to 777.53 tons.

The number of miles run by revenue freight trains, including proportion of mixed, was 9,804,900, a decrease of 225,972, or 2.25 per cent.

Passenger Business

Passenger revenue was $11,773,282.70, a decrease of $866,706.98, or 6.86 per cent.

Mail revenue was $1,699,241.35, a decrease of $23,706.63, or 1.38 per cent.

Express revenue was $1,791,673.09, a decrease of $33,873.60, or 1.86 per cent.

Sleeping car, parlor and chair car, excess baggage and miscellaneous passenger revenue was $1,084,469.37, a decrease of $104,644.57, or 8.80 per cent.

Total revenue from persons and property carried on passenger and special trains was $16,348,666.51, a decrease of $1,028,931.78, or 5.92 per cent.

The number of passengers carried was 2,680,721, a decrease of 126,140, or 4.49 per cent. The number of passengers carried one mile was 379,991,181, a decrease of 26,637,207, or 6.55 per cent.

The number of miles run by revenue passenger trains, including proportion of mixed, was 9,580,654, a decrease of 30,893, or .32 per cent.

The average revenue per passenger mile decreased from 3.108 to 3.098 cents.

Transportation—Rail Line

The charges for transportation expenses were $31,902,292.48, a decrease of $389,672.33, or 1.21 per cent, as against a decrease in total operating revenue of 1.82 per cent.

Maintenance of Equipment

The charges for maintenance of equipment were $17,865,172.25, an increase of $450,534.07, or 2.59 per cent. Of the total charges $4,156,796.42 represents depreciation, accrued at the rate of 4 per cent.

Locomotives

Total number of locomotives on active list, December 31, 1926		1,249
Additions:		
Locomotives purchased		12
		1,261
Deductions:		
Locomotives sold	3	
Locomotives withdrawn from service, to be dismantled	38	41
Total locomotives on active list, December 31, 1927		1,220
In addition to locomotives on active list there were:		
Withdrawn from service and on hand December 31, 1926	16	
Withdrawn from service during the year	38	54
Less—Dismantled		54
Leaving on hand locomotives withdrawn from service which may be sold or dismantled		None

EARNINGS AND EXPENSES PER MILE OPERATED

	1917	1923	1924	1925	1926	1927
Operating revenues per mile	$13,526.37	$15,294.98	$14,265.46	$14,620.55	$14,568.38	$14,329.17
Operating expenses per mile	8,171.39	12,050.52	10,558.94	10,453.59	10,215.11	10,173.20
Net operating revenue per mile	5,354.98	3,244.46	3,706.52	4,166.96	4,353.27	4,155.97
Taxes per mile	1,059.52	1,268.99	1,279.47	1,396.39	1,369.45	1,335.41
Net after taxes	4,295.46	1,975.47	2,427.05	2,770.57	2,983.82	2,820.56

RATIOS

	1917	1923	1924	1925	1926	1927
Operating expenses to operating revenues	60.41%	78.79%	74.02%	71.50%	70.12%	71.00%
Transportation expenses to operating revenues	32.34%	37.78%	35.88%	34.27%	33.17%	33.38%
Taxes to operating revenues	7.83%	8.30%	8.97%	9.55%	9.40%	9.32%

[Advertisement]

Hauling Capacity

	Number	Tractive power (Pounds)	Total weight on drivers (Pounds)	Total weight of locomotives (Pounds)
Assignment December 31, 1926	1,249	49,721,080	222,281,604	284,830,714
Added during year—purchased	13	739,200	3,120,000	5,112,000
Added during year *	....	1,175,560	159,500	240,600
Total	1,261	51,635,840	225,561,104	290,183,314
Locomotives sold or withdrawn from service	41	1,327,600	6,232,837	7,590,462
Total December 31, 1927	1,220	50,308,240	219,328,267	282,592,852

* Changes in weights and tractive power are due to locomotives having boosters or superheaters applied, changes in steam pressure and in size of cylinders.

The following statement shows the character and condition of the locomotives of the Company on December 31, 1927.

	December 31, 1927		December 31, 1926	
Condition	Number	Per cent	Number	Per cent
Good	1,023	83.85	1,044	83.59
Fair	67	5.49	73	5.84
At shops or awaiting shop	109	8.94	111	8.89
Unserviceable, awaiting disposition	21	1.72	21	1.68
	1,220	100.00	1,249	100.00
Number of oil burning locomotives	21	1.72	19	1.52
Number of locomotives equipped with superheaters	806	66.07	781	62.53
Number of locomotives equipped with stokers	282	23.11	267	21.38
Number of locomotives equipped with boosters	38	3.11	23	1.84

The purchase of one four-cylinder simple mallet locomotive for experimental purposes in the handling of freight trains on the Yellowstone Division has been authorized. Delivery is expected early in the autumn of 1928.

Freight car situation on December 31st

	1927	1926	Increase—I Decrease—D
N. P. cars on line	37,077	37,964	D 917
Foreign cars on line	7,587	8,177	D 590
Total cars on line	44,664	46,171	D 1,507
N. P. cars on foreign lines	12,417	11,631	I 786
Number of cars unserviceable	3,398	2,963	I 435
Percentage of unserviceable to total cars on line	7.61	6.42	I 1.19
Number of cars requiring heavy repairs	1,656	1,444	I 212
Percentage of above to total cars on line	3.71	3.13	I .58
Number of cars requiring light repairs	1,742	1,519	I 223
Percentage of above to total cars on line	3.90	3.29	I .61

Maintenance of Way and Structures

The charges for maintenance of way and structures were $11,965,278.42, a decrease of $332,124.51, or 2.70 per cent.

The table on page 28 shows the distribution of this decrease under the respective accounts.

The following statements give particulars of some of the work done.

Permanent Way

	Year 1927	Year 1926
New second track laid with 90 pound rail..miles	.....	.05
New branch lines laid with 90 pound rail, second hand .....miles	.06	.....
Main line relaid with 130 pound rail.....miles	5.20	9.96
Main line relaid with 100 pound rail.....miles	72.97	205.85
Main line relaid with 90 pound rail.....miles	.....	1.65
Second track relaid with 130 pound rail....miles	.....	.53
Second track relaid with 100 pound rail....miles	10.60	24.76
Second track relaid with 90 pound rail....miles	.....	1.34
Branch lines relaid with 100 pound rail.....miles	.04	.....
Branch lines relaid with 100 pound rail second hand .....miles	.....	1.20
Branch lines relaid with 90 pound rail, second hand .....miles	46.70	8.21
Branch lines relaid with 85 pound rail, second hand .....miles	3.71	1.61
Sidings and spurs constructed.....miles	51.80	32.00
Track ballasted with washed gravel.....miles	188.28	173.16
Track ballasted with washed gravel...Cubic yards	527,074	507,903
Track ballasted with bank-run gravel .....miles	63.84	81.42
Track ballasted with bank-run gravel.Cubic yards	176,773	134,693
Track ballasted with bank-run gravel (patch or repairs) .....Cubic yards	129,863	45,585
Embankments widened .....miles	167.45	299.18
Embankments widened .....Cubic yards	365,261	443,899
Cross, bridge and switch tie renewals, main line .....ties	1,015,296	1,016,565
Cross, bridge and switch tie renewals, branch lines .....ties	633,208	601,891
Timber bridges replaced by permanent structures and embankments	51	57
Equal to .....miles	2.25	2.97
Timber bridges renewed	28	45
Timber culverts renewed	23	15
Timber culverts replaced in permanent form....	103	113
New stock fences constructed.....miles	61.83	59.81
New snow fences constructed.....miles	.54	.....

Bridges

85 bridges were replaced, 28 of which, 3,303 linear feet in length, were replaced by timber, and 6 permanent and 51 timber structures were replaced in permanent form, as follows:

Replaced by embankment.....39 bridges, 10,978 linear feet.
Replaced by steel draw span, steel truss, girder and reinforced concrete trestle.....18 bridges, 3,086 linear feet.

Total.....57 bridges, 14,064 linear feet.

In addition to changes referred to above, 9 temporary bridges were abandoned, 6 permanent and 7 temporary bridges were added and 126 culverts were rebuilt, 23 in temporary and 103 in permanent form. Marent viaduct, near De Smet, Montana, 797 feet long and 226 feet high was reinforced to carry standard loading; 13 I beam bridges with a total of 737 linear feet, were reinforced with additional I beams to carry standard loading.

Bridges as they existed December 31, 1927.

Description	Number	Linear feet	Miles
Steel, iron, stone and concrete permanent bridges..	876	152,175	28.82
Timber and combination iron and timber structures	2,357	336,705	63.77
Total	3,233	488,880	92.59

Total length of timber structures replaced by steel bridges, embankments or other permanent form from July 1, 1885, when work was commenced, to December 31, 1927, 152.44 miles.

There are now under construction 812 linear feet of steel truss for single track, 136 linear feet of girder and I-beam for double track and 502 linear feet for single track, and 60 linear feet of reinforced concrete trestle for double track.

Water Supply

The water treating plant at Valley City, North Dakota, was enlarged and improved. Treating plants are under construction and will be completed during 1928 at Beach, Belfield, Dickinson, Glenullen, Mandan, Medora, Richardton, Sims and Sterling in North Dakota; at Benz, Conlin, Custer, Forsyth, Glendive, Heckman, Huntley, Joppa, Laurel, Miles City, Pompeys Pillar, Sanders and Wibaux in Montana.

Improvements were made in the water stations at Dilworth, Hinckley and St. Paul in Minnesota and at Olympia in Washington.

Fuel Stations

Gasoline storage tanks for use of motor cars were installed at Dilworth and Staples, Minnesota. The coal dock at Hazen, North Dakota, was improved, and the one at Easton, Washington, was replaced with a modern coal bunker.

Block Signals and Interlockers

Automatic block signals have been installed on the Valley City, North Dakota, low line and between Logan and Whitehall and between Butte and Warm Springs, Montana.

Miscellaneous

The new power plant for engine terminal at Mandan, North Dakota, is under construction and will be completed early in the summer of 1928.

Two sections of the new roundhouse at Glendive, Montana, are being reconstructed to accommodate new and heavier engines.

The new freight terminals at Spokane, Washington, have been completed.

The Oro Fino Branch was completed and turned over for operation midnight, December 31, 1927.

Authority was obtained from the Interstate Commerce Commission for the construction of a branch line from Glendive to Circle and Brockway, Montana, a distance of approximately 62 miles. The grading, bridging and track laying on the first 31 miles was completed during 1927, and the entire branch will be completed by midsummer of 1928.

General

Financial Results of Operation.

The operation of your property, after all charges, resulted in a net income of $18,538,423.78, a decrease of $2,464,308.28, or 11.73%, compared with 1926. Freight revenue decreased $763,109.78, or 1.00%; revenue tons carried one mile decreased 67,684,719, or 1.02%; the average distance hauled per revenue ton decreased from 288.85 miles to 284.45 miles, or 1.52%, while the average revenue per ton mile was the same as in 1926, or 1.148 cents. Passenger revenue decreased $866,706.98, or 6.86%; passengers carried decreased 126,140, or 4.49%; revenue per passenger mile decreased from 3.108 cents to 3.098 cents, or 0.32%, and the average distance traveled by each passenger decreased from 144.87 miles to 141.75 miles, or 2.15%. Other passenger train revenue decreased $162,224.80, or 3.42%.

The total operating revenues of the company decreased $1,776,225.68, or 1.82%, compared with 1926; total operating ex-

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Michigan Central Railroad Company—Annual Report

To the Stockholders of
THE MICHIGAN CENTRAL RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1927, with statements showing the income account for the year and the financial condition of the company.

The Year's Business

During 1927 the company moved 31,415,851 tons of revenue freight, a decrease as compared with 1926 of 1,765,722 tons. The more important decreases were: coal and coke 371,524 tons; gravel, sand and stone 655,144 tons; lumber, timber and other forest products 344,567 tons; automobiles and trucks 208,940 tons; and other manufactures and miscellaneous 105,843 tons.

Revenue passengers carried were 3,772,123, a decrease of 503,391, of which 37,234 were in interline, 414,828 in local and 51,329 in commutation passengers.

Income Account for the Year

	Year ended Dec. 31, 1927	Year ended Dec. 31, 1926	Increase or decrease
OPERATING INCOME	1,858.42 *miles*	1,855.98 *miles*	2.44 *miles*
RAILWAY OPERATIONS	*operated*	*operated*	
Railway operating revenues	$89,750,601.95	$95,524,343.34	—$5,773,741.39
Railway operating expenses	62,244,288.16	64,957,363.74	—2,713,075.58
NET REVENUE FROM RAILWAY OPERATIONS	$27,506,313.79	$30,566,979.60	—$3,060,665.81
Percentage of expenses to revenues	(69.35)	(68.00)	(1.35)
Railway tax accruals	$6,247,714.64	$5,979,584.60	$268,130.04
Uncollectible railway revenues	25,668.93	24,747.55	921.38
RAILWAY OPERATING INCOME	$21,232,930.22	$24,562,647.45	—$3,329,717.23
Equipment rents, net credit	$294,778.82	$424,049.34*	—$718,828.16
Joint facility rents, net debit	538,883.24	573,467.62	—34,584.38
NET RAILWAY OPERATING INCOME	$20,988,825.80	$23,565,130.49	—$2,576,304.69
MISCELLANEOUS OPERATIONS			
Revenues	$395,388.09	$366,054.63	$29,333.46
Expenses and taxes	321,030.59	324,821.23	—$3,790.64
MISCELLANEOUS OPERATING INCOME	$74,357.50	$41,233.40	$33,124.10
TOTAL OPERATING INCOME	$21,063,183.30	$23,606,363.89	—$2,543,180.59
NON-OPERATING INCOME			
Income from lease of road	$236.51	$10.00	$226.51
Miscellaneous rent income	230,775.18	178,442.67	52,332.51
Miscellaneous non-operating physical property	70,151.22	81,757.69	—11,606.47
Dividend income	582,958.00	571,148.01	11,809.99
Income from funded securities	749,775.96	451,036.87	298,739.09
Income from unfunded securities and accounts	319,349.11	431,687.65	—112,338.54
Miscellaneous income	7,826.78	8,068.90	—242.12
TOTAL NON-OPERATING INCOME	$1,961,072.76	$1,722,151.79	$238,920.97
GROSS INCOME	$23,024,256.06	$25,328,515.68	—$2,304,259.62
DEDUCTIONS FROM GROSS INCOME			
Rent for leased roads	$2,735,315.46	$2,735,882.82	—$567.36
Miscellaneous rents	4,898.33	10,074.66	—5,176.33
Miscellaneous tax accruals	70,474.24	21,529.19	48,945.05
Interest on funded debt	3,158,934.65	3,417,167.77	—258,233.12
Interest on unfunded debt	22,977.43	9,688.67	13,288.76
Amortization of discount on funded debt	154,408.44	161,988.03	—7,579.59
Maintenance of investment organization	1,306.45	1,980.33	—673.88
Miscellaneous income charges	9,383.08	6,305.40	3,077.68
TOTAL DEDUCTIONS FROM GROSS INCOME	$6,157,698.08	$6,364,616.87	—$206,918.79
NET INCOME	$16,866,557.98	$18,963,898.81	—$2,097,340.83
DISPOSITION OF NET INCOME			
Dividends declared: 40 per cent in 1927; 35 per cent in 1926	$7,494,560.00	$6,557,740.00	$936,820.00
SURPLUS FOR THE YEAR CARRIED TO PROFIT AND LOSS	$9,371,997.98	$12,406,158.81	—$3,034,160.83

* Debit.

Profit and Loss Account

BALANCE TO CREDIT OF PROFIT AND LOSS, DECEMBER 31, 1926		$82,358,614.74
ADDITIONS:		
Surplus for the year 1927	$9,371,997.98	
Profit on property sold	144,264.41	
Unrefundable overcharges	22,517.46	
Profit on securities sold	390,916.54	
Miscellaneous items (net)	14,977.58	9,944,673.97
		$92,303,288.71
DEDUCTIONS		
Dividend appropriation of surplus (50%)	$9,368,200.00	
Surplus appropriated for investment in physical property	22,622.91	
Depreciation prior to July 1, 1907, on equipment retired during year	167,755.78	
Loss on property retired	492,920.12	
Premium account payment before maturity of equipment trust notes of 1920 and unamortized balance of expenses on same	85,560.00	10,137,058.81
BALANCE TO CREDIT OF PROFIT AND LOSS, DECEMBER 31, 1927		$82,166,229.90

Operating Revenues

The total operating revenues were $89,750,601.95, a decrease of $5,773,741.39.

Freight revenue was $60,355,090.02, a decrease of $4,134,671.53.

Passenger revenue was $20,202,686.31, a decrease of $1,335,253.01. The average distance passengers were carried in 1927 was 152.96 miles, while in 1917 it was 85.94 miles, an increase during the eleven years of 67.02 miles or 78 per cent, reflecting the greater volume of long haul business.

Mail revenue was $1,048,584.86, an increase of $101,499.46, due to a larger volume of traffic.

Express revenue was $4,115,980.20, a decrease of $327,390.76, the result of a falling off in business handled.

Other transportation, incidental and joint facility revenue was $4,028,260.56, a decrease of $77,925.55.

Operating Expenses

The following table shows the operating expenses by groups:

Group	Amount	Decrease
Maintenance of way and structures	$10,344,918.92	$1,183,264.08
Maintenance of equipment	16,718,888.01	1,345,651.70
Traffic	1,511,076.43	*142,808.12
Transportation	29,525,765.27	375,039.14
Miscellaneous	1,167,848.99	*25,240.15
General	3,026,330.11	56,097.24
Transportation for investment—credit	50,539.57	*78,928.31
Total	$62,244,288.16	$2,713,075.58

* Increase

The decrease in expense for maintenance of way and structures is largely the result of heavy charges in 1926 to operating expenses in connection with improvements at the Third Street Terminal at Detroit and elsewhere, of reduction in the number of ties used for renewals and of reduction in charges for removing snow and ice.

The decrease in expense for maintenance of equipment is mainly accounted for in locomotive repairs, due to replacement of older engines by new and improved ones, and in freight car repairs, the result of a reduced number of units undergoing repairs at the company's shops and by other carriers.

The decrease in transportation expenses reflects the decline in both passenger and freight traffic, concurrently with which operating forces were reduced. The resulting economies were in part offset by increased rates of pay and increased prices of fuel.

The decrease in general expenses is principally due to a reduction in charges for pensions attributable in large part to fewer voluntary retirements under the service provisions of the pension rules, and to decreased valuation expenses the result of a reduction in forces. There were increases in other accounts of this group, notably in salaries of clerks and attendants following an adjustment of wages.

Net Income Before Dividends

The net income of the company was $16,866,557.98, a decrease of $2,097,340.83.

Changes in Funded Debt

The funded debt outstanding on December 31, 1926, was $73,968,942.31

It has been reduced as follows:

By payments falling due during the year and on January 1, 1928, on the company's liability for principal installments under Equipment Trust Agreements as follows:	
N Y C Lines Trust of 1913, January 1, 1928	$262,359.56
M C R R Trust of 1915, October 1, 1927	300,000.00
M C R R Trust of 1917, March 1, 1927	600,000.00
Trust No. 48 (1920), January 15, 1927	346,400.00
Trust No. 48 (1920), July 15, 1927 (remaining installments paid in full)	2,771,200.00
M C R R Co proportion of N Y C R R Co	

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Trust of 1920, April 15, 1927	467,664.75	
N Y C Lines Trust of 1922, June 1, 1927	373,000.00	
N Y C Lines 4½ per cent Trust of 1922, September 1, 1927	51,000.00	
N Y C Lines Trust of 1923, June 1, 1927	632,000.00	
N Y C Lines Trust of 1924, June 1, 1927	233,000.00	
N Y C Lines 4½ per cent Trust of 1924, September 15, 1927	173,000.00	
N Y C Lines 4½ per cent Trust of May 15, 1925, May 15, 1927	234,000.00	6,443,664.31
leaving the funded debt on December 31, 1927		$67,525,318.00

Dividends

Dividends declared and charged against the income of the year were as follows:

Date declared	Date payable	Rate per cent	Amount
June 15, 1927	July 29, 1927	20	$3,747,280.00
December 14, 1927	January 28, 1928	20	3,747,280.00
Total for the year		40	$7,494,560.00

An extra dividend of 50 per cent, paid out of the company's accumulated surplus, was declared December 14 payable December 30, 1927.

Property Investment Accounts

Increases in the property investment accounts for the year, as shown in detail elsewhere in this report, were as follows:

Road	$1,103,621.26
Equipment	1,515,011.62
Improvements on leased property	40,232.21
Miscellaneous physical property	200,887.46
Total	$2,859,752.55

Proposed Lease of the Company's Properties to The New York Central Railroad Company

The proceedings before the Interstate Commerce Commission in which The New York Central Railroad Company is seeking the authority of the Commission for the leasing of the lines of railroad and properties of this company, as set forth in the Annual Report for 1926, are still pending. Hearings took place in January, 1927, but the case was reopened for the introduction of additional evidence at a hearing which will be held early in 1928.

Automatic Train Control

During the year an installation of automatic train control was placed in operation between Niles, Michigan, and Kensington, Illinois, thus completing the automatic train stop system between Detroit and Chicago.

Valuation of the Company's Property by the Interstate Commerce Commission

During the year 1926 and the early part of the year 1927, representatives of the company were engaged in conferences with the representatives of the Bureau of Valuation of the Interstate Commerce Commission for the purpose of arriving, if possible, at agreements concerning the cost of reproduction new, depreciation and land values with respect to the property of the company and its leased lines as of June 30, 1918. These conferences were predicated upon the assumption of the correctness of the methods, rules and principles employed by the Commission with a reservation to the company of the right, at formal hearing, to contest the correctness of these methods, rules and principles. On this basis agreements were reached in many instances. The tentative valuation in this case had been served during the year 1925. A protest thereto had been duly filed.

The case came on for formal hearing before the Commission in August, 1927, being consolidated with the case of The New York Central Railroad Company and other system lines. Briefs were subsequently filed and oral argument submitting the case was had on November 30, 1927. A decision may be expected during 1928.

The Board wishes to express its appreciation of the loyal and efficient service of the officers and employees of the company during the year.

For the Board of Directors,
P. E. CROWLEY,
President.

[ADVERTISEMENT]

Financial

(*Continued from page 1463*)

Company, has applied to the Interstate Commerce Commission for authority to abandon its entire line, 40 miles including branches, in Monterey and Santa Cruz counties, Calif., on account of lack of business.

RIO GRANDE.—*Sale.*—Properties of this company were sold at public sale at Brownsville, Tex., on June 5 to W. T. Eldridge for $700,454.63. The railroad was placed in the hands of a receiver in November, 1925. In February, 1926, the receiver was discharged and Mr. Eldridge was appointed trustee and authorized to operate the railroad for two years without selling it during that time.

YAZOO & MISSISSIPPI VALLEY.—*Bonds.*—The Interstate Commerce Commission has authorized an issue of $2,374,000 of 5 per cent gold improvement bonds, series Y, to be delivered at par to the Illinois Central in payment of advances.

Dividends Declared

New Orleans & Northeastern.—6 per cent, payable June 27 to holders of record June 20.
New York Central.—2 per cent, quarterly, payable August 1 to holders of record June 29.

Average Prices of Stocks and of Bonds

	June 19	Last week	Last year
Average price of 20 representative railway stocks.	115.49	116.89	114.10
Average price of 20 representative railway bonds..	94.28	93.88	93.76

Railway Officers

Financial, Legal and Accounting

L. V. Johnson has been appointed auditor of the Intermountain, with headquarters at Boise, Idaho.

The jurisdiction of **E. M. Mann**, chief claim agent of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, has been extended to cover the entire Nickel Plate system. **F. M. Thompson**, claim agent, with headquarters at Frankfort, Ind., has been promoted to assistant chief claim agent in charge of the Clover Leaf and Lake Erie & Western districts, with headquarters at Cleveland.

Axel L. Genzmer, who has been appointed auditor of the Buffalo, Rochester & Pittsburgh, with headquarters at Rochester, N. Y., effective July 1, was born on December 3, 1870, at Strelitz, Germany. He was educated at Collegiate Institute, Toronto, Ont., and Thiel College, Greenville, Pa. He entered railway service on February 13, 1893, as a stenographer for the Buffalo, Rochester & Pittsburgh. From December 22, 1905 to December 1, 1913, he was chief clerk in the accounting department and on the latter date he was promoted to the position of assistant auditor, serving in this position until 1918, when he was appointed federal auditor. He served in that capacity until 1920, when he again became assistant auditor, which position he held at the time of his recent appointment.

Axel L. Genzmer

Operating

F. W. Parker has been appointed general manager of the Galveston Wharf Company, with headquarters at Galveston, Tex.

C. W. Blount has been appointed assistant trainmaster of the Panhandle division of the Pennsylvania, with headquarters at Zanesville, Ohio.

H. E. Beasley, general superintendent of the Esquimalt & Nanaimo, with headquarters at Victoria, B. C, will retire from active railroad service on July 1.

W. B. Moir, general car inspector on the Eastern Ohio division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been transferred in the same capacity to the Southern division.

L. G. Johnson, inspector of agencies of the Cumberland Valley division of the Louisville & Nashville, with headquarters at Middlesborough, Ky., has been promoted to inspector of agencies for the entire system, with headquarters at Louisville, Ky.

R. Woodford, trainmaster on the Texas & Pacific at Big Spring, Tex., has been appointed train rules instructor at Dallas, Tex., succeeding **L. L. Oliver,** who has been appointed trainmaster at Shreveport, La. Mr. Oliver succeeds **J. G. Brannon,** who has been transferred to Alexandria, La.

Traffic

I. Wilson has been appointed traffic manager of the Intermountain, with headquarters at Boise, Idaho.

Lynn R. Challoner, assistant general freight agent of the Northern Pacific, with headquarters at St. Paul, Minn., has been appointed assistant general freight and passenger agent in Montana, with headquarters at Helena, Mont.

Jay S. Henney, who has been promoted to assistant freight traffic manager of the New York, Chicago & St. Louis, with headquarters at St. Louis, Mo., was born on November 3, 1883, at Albany, N. Y. He entered railway service in 1908 in the traffic department of

Jay S. Henney

the Chicago, Burlington & Quincy at Cleveland, Ohio. The following year he became connected with the Chicago & North Western at the same point and in 1911 he entered the service of the Illinois Central at Cleveland. Mr. Henney was appointed to a minor position in the traffic department of the Toledo, St. Louis & Western (now part of the Nickel Plate) at Cleveland in 1913 and in 1914 he was transferred to Kansas City, Mo. He was promoted to assistant general freight agent, with headquarters at St. Louis in 1918. In 1924, soon after the T., St. L. & W. was consolidated with the Nickel Plate, Mr. Henney was appointed general freight agent of the latter railroad, with headquarters at Toledo, Ohio. His promotion to assistant freight traffic manager with jurisdiction over the southern and southwestern territory became effective on June 1.

J. J. Morton, foreign freight agent of the Canadian Pacific at New York, has been promoted to general foreign freight agent, with headquarters at Montreal, Que., succeeding **W. T. Marlow,** who has been appointed special representative of the foreign freight department at Montreal.

Engineering, Maintenance of Way and Signaling

John C. Nichols, a draftsman in the bridge department of the chief engineer's office of the Louisville & Nashville at Louisville, Ky., has been promoted to assistant engineer in the miscellaneous department of the chief engineer's office, with headquarters at the same point.

G. R. Barry, superintendent of the recently abolished Richmond division of the Pennsylvania, has been appointed assistant to the engineer of maintenance of way of the Southwestern division, with headquarters at Indianapolis, Ind. **Maurice Coburn,** assistant to the division engineer of the Cincinnati division, with headquarters at Cincinnati, Ohio, has been promoted to assistant to the engineer of maintenance of way of the Northwestern division, with headquarters at Chicago.

A. M. Clark, division engineer of the Ft. Wayne-Chicago divisions of the New York, Chicago & St. Louis, with headquarters at Ft. Wayne, Ind., has been promoted to engineer of track, with headquarters at Cleveland, Ohio, succeeding **F. S. Hales,** who has been promoted to engineer of the Cleveland Terminal Improvements, with headquarters at the same point. **Paul McKay,** assistant district engineer of the Lake Erie & Western district, with headquarters at Indianapolis, Ind., has been appointed division engineer of the Ft. Wayne-Chicago divisions, replacing Mr. Clark. Mr. McKay has been succeeded as assistant engineer of the Lake Erie & Western district by **Harold F. Whitmore.**

John Johnson Taylor, who retired on June 1 as superintendent of bridges and buildings and water service of the Kansas City Southern and the Texarkana & Fort Smith, with headquarters at Texarkana, Tex., had been in the service of that railroad for 26 years. He was born on November 14, 1861, at Coffeeville, Miss., and entered railway service in 1884 as a section laborer on the East Line (a narrow gage railroad which is now part of the Louisiana Railway & Navigation Company) at Shreveport, La. The following year he became an extra section gang foreman on the St. Louis Southwestern, where he remained until 1887 when he was transferred to the bridge and building department. Mr. Taylor started in this department as a laborer, was advanced to assistant foreman and in 1889 he was promoted to bridge and pile driver foreman. He entered the service of the Kansas City Southern in March, 1902, as general foreman of bridges and buildings and water service on the Southern division. Two years later Mr. Taylor was promoted to superintendent of bridges and buildings and water service of the Kansas City Southern System, with headquarters at Texarkana.

Mechanical

Robert Senniff, assistant chemical engineer of the Chicago & Alton, with headquarters at Bloomington, Ill., has been promoted to chemical engineer, with headquarters at the same point, succeeding **L. O. Gunderson,** who resigned on June 15 to become president of the Electro Chemical Engineering Corporation, Chicago, which will manufacture water softening and treating plants.

Obituary

Frank Neher, assistant engineer on the Missouri Pacific at St. Louis, Mo., until his retirement from active service in 1918, died at his home in Washington, Mo., on June 12 at the age of 71 years. During his service with the Missouri Pacific Mr. Neher was in charge of the construction of the freight terminals at Dupo, Ill.

Hezekiah E. Van Housen, who was superintendent of the Salt Lake division of the Los Angeles & Salt Lake, with headquarters at Salt Lake City, Utah, from 1905 until his retirement in 1921 and who had been in the service of the Union Pacific System for 49 years, died at his home in San Gabriel, Cal., on June 16. Mr. Van Housen was born at Lexington, N. Y., on May 13, 1852, and entered railway service on the Union Pacific on March 2, 1872, as a bridge carpenter. For the next 23 years he served at various points on the Union Pacific as a brakeman, freight conductor, passenger conductor, trainmaster and assistant superintendent. On June 1, 1895, he was promoted to superintendent of the Idaho division; on March 16, 1896, he was appointed superintendent of the Oregon Short Line at Pocatello, Idaho, and on May 15, 1899, he was appointed assistant superintendent of the Wyoming division of the Union Pacific. Mr. Van Housen was appointed superintendent of the Salt Lake division of the San Pedro, Los Angeles & Salt Lake (now the Los Angeles & Salt Lake) on January 1, 1905, retiring in 1921 at the age of 69 years.

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Two Sections—Section Two

Railway Age

Motor Transport Section

Devoted to the Co-ordination of Railway and Highway Service

FIRST HALF OF 1928—No. 25 JUNE 23, 1928 SEVENTY-THIRD YEAR

Articles in This Issue:

A Survey of Railway Motor Coach and Motor Truck Operation
Executives Comment on Motor Coach and Truck Operation
The Story of the Motor Transport Division, A.R.A.
Motor Transport Equipment at the Convention

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Railway Age
Motor Transport Section
Devoted to the Co-ordination of Railway and Highway Service

Vol. 84 June 23, 1928 No. 25

Motor Transport and the Railways

THE adoption of the motor coach and the motor truck by the steam railways, in providing various forms of passenger and freight service, continues to go ahead at a steady pace. At tne present time 64 railways are operating motor coaches, compared with 52 a year ago. The number of motor coaches operated by these railways is 1,047 compared with 800 at this time last year. Their motor coach routes are to be found in all parts of the United States and they now aggregate 14,805 miles in length.

Forty-five railways, in addition to those utilizing the joint terminal motor services at St. Louis and Cincinnati, are now operating motor trucks, tractors and trailers, as compared with 31 roads a year ago. The number of trucks, tractors and trailers operated, most of which have been arranged for under contracts, is 4,902, a substantial increase over the number of units operate l at this time last year, when 3,300 motor trucks, tractors and trailers were engaged in the transportation of freight for the railways. The number of routes and terminals served by the railway motor vehicle freight carriers is 298, compared with 259 a year ago.

These statistics, which prove so conclusively that an increasing number of the railways are going ahead purposefully with plans for supplementing or replacing their passenger and freight train service by the operation of motor vehicles on the highways, were obtained in a survey just completed. The results of this survey are shown in tabular form on following pages of this issue of the *Motor Transport Section.*

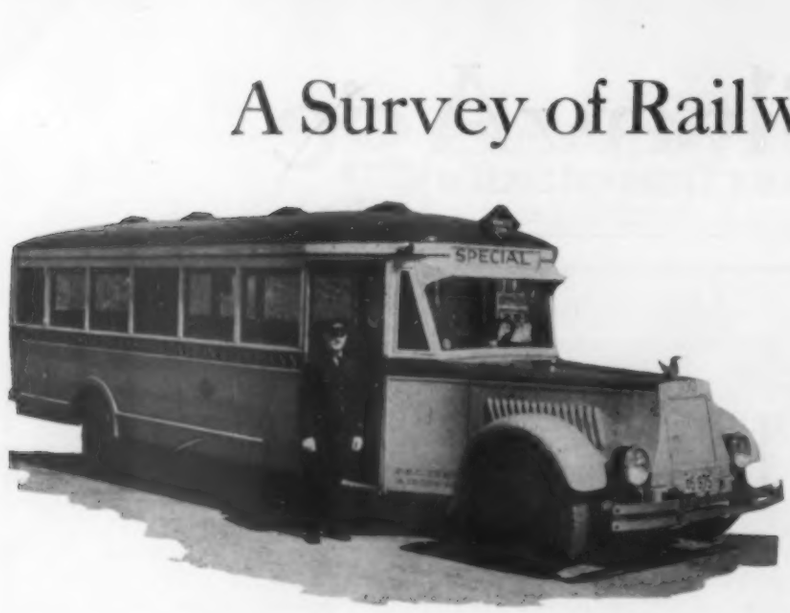
Why are the railways operating motor coaches and motor trucks? The answer is found in the comments of railway executives on their highway operations, which are likewise published in this issue. Passenger traffic has been steadily declining for a number of years. How has the operation of motor coaches by the railways affected this situation? Although one executive reports continued losses, even with motor coach operation, another says, "Our motor coach operations have undoubtedly recovered passenger traffic previously lost to competitive highway lines or private automobiles." Another executive says, "The increase in travel by our motor coaches has been about 25 per cent, practically all of which has, in our opinion, come from previous users of private automobiles." Another executive states, "The motor coach service has allowed some reduced passenger train service, and some passenger travel lost to the rail lines was picked up by this service." Commenting on the results of motor coach operation in reducing operating expenses, another executive says, "Our particular situation when motor coach operation was installed in lieu of passenger train operation enabled us to take off three short round-trip passenger runs. For the period from May, 1927, to and including March, 1928, our motor coach services cost us only 55 per cent of what the passenger train operation cost to serve the same purpose."

The handling of l.c.l. freight in terminals and on short line hauls by freight car, in many instances, has likewise been unduly expensive. How has the operation of motor trucks and tractors and trailers by the railways resulted in reducing the cost of the provision of the service? In this connection one executive, speaking of a motor truck operation in replacement of a local freight train, says, "This operation has resulted in operating economies of $1,400 per month." Another executive says, "We have been very successful in the use of motor trucks as a means of concentrating l.c.l. freight at central points for loading through cars and also for transferring freight between freighthouses of our own and foreign lines. Such operations have made possible the loading of through cars not otherwise possible and have otherwise expedited the service." Another executive says, "We have been operating a tractor and semi-trailers for handling l.c.l. freight between several freight stations, such vehicles being used in place of trap cars. Our figures show that considerable economies have been secured in the handling of our business in this manner, compared witn trap car operation, and it has permitted us to make more prompt delivery oi this freight, as under this operation we are able to forward all freight to its proper destination on the same day it is received. The tonnage handled by these vehicles during 1927 was approximately 15 per cent more than that handled during the previous year."

What is the future of motor transportation in its relation to the railways? There seems to be no doubt that we shall soon see still more railways operating more motor vehicles. It is readily apparent from the facts stated above that a large number of the railways are already operating motor coaches and motor trucks successfully. Experimentation with the operation of motor coaches and trucks in many different kinds of service has advanced to a point where sufficient experience has been gained to provide a foundation for the railways to build upon in the future. The Motor Transport Division of the American Railway Association, just now catching its stride, is expected to be an important factor in shaping future developments in connection with the general co-ordination of railway and highway service. Through this organization a clearing house will be established for the experiences of the various railways in operating motor coaches and trucks. The railways instituting motor services for the first time will not have to approach their operating problems blindly; from the experience of other roads already engaging in similar operations, solutions of these problems will be known even before they are actually encountered.

A Survey of Railway Motor Coach

As the result of rapid expansion in the past year, 45 railways now trucks, tractors and trail- approximately eleven



MOTOR COACH, motor truck, and tractor and trailer operation for the transportation of passengers and freight is steadily becoming a more important part of the railway business. This is indicated by a survey just completed by the *Railway Age* in which the number of motor vehicles operated by each road and the uses to which they are being put have been disclosed.

The survey shows that on June 1, 1928, the number of steam railways engaging in the operation of motor coaches for the transportation of passengers, either to supplement or to replace train service, was 64. About a year ago when a similar survey was made, it was found that only 52 railways were engaging in motor coach operation. The number of motor coaches operated on June 1 by the steam railways was approximately 1050, comparing with 800 motor coaches operated by the railways a year ago. The steam railways have at this time approximately 340 motor coach routes, a substantial increase over the number operated a year ago when the survey at that time showed 200 motor coach routes operated by the steam railways. The number of miles of motor coach routes operated by the roads this year shows an even more substantial increase. On June 1, 1928, the steam railways operated approximately 15,000 miles of motor coach routes, while a year ago they had only approximately 8,000 miles of routes in their highway systems.

PROGRESS IN RAILWAY MOTOR COACH OPERATION

	1928	1927
Number of Roads Operating Motor Coaches	64	52
Number of Motor Coaches Operated	1,047	800
Number of Motor Coach Routes Operated	340	200
Aggregate Motor Coach Route Mileage	14,805	8,000

With respect to motor truck, tractor and trailer operations there has been similar expansion. According to the survey just completed, the number of railways operating motor vehicles for the transportation of freight is now 45, compared with 31 such railways a year ago. It was reported a year ago that approximately 3,300 motor trucks, tractors and trailers were operated by the steam railways. This year the number of units of such equipment is close to 5,000, 4,902 to be exact. This equipment is being operated in approximately 300 terminals and line sections. A year ago the steam railways were operating motor vehicles in 259 terminals and line sections. The number of miles of motor truck routes operated by the railways is now 3,521. No figure is available to afford a comparison between the mileage of motor truck lines this year with that of similar lines last year, but it is known that there has been a large increase during the past year.

These figures do not include the terminal operations of the railways at St. Louis, Mo., and Cincinnati, Ohio. At St. Louis all of the railways entering the St. Louis, Mo., and East St. Louis, Ill., terminals contract with the Columbia Terminals Company for freight transfers by tractor and trailer. The Columbia Terminals Company operates approximately 500 tractors and trailers. Similarly, at Cincinnati, Ohio, the railways contract with the Cincinnati Motor Terminals Company for motor truck transfer service. The Cincinnati Motor Terminals Company operates approximately 50 motor trucks with demountable bodies.

The New York, New Haven & Hartford still holds the position it occupied a year ago as the railway operating the largest number of motor coaches. This road, through its subsidiary, the New England Transportation Company, is operating 254 motor coaches on 59 routes aggregating 1,767 miles in length. Since 1925, when it first undertook the operation of motor coaches on the highways, this company has steadily expanded its operations of this character. Most of its motor coach routes are short—the average length is approximately 30 miles—but the company has one route extending from New York to Boston, a distance of 237 miles.

Although not operating as many motor coaches or as many motor coach routes as the New Haven, the Great Northern has a considerably larger motor coach system. Through the Northland Transportation Company, it operates 133 motor coaches on 52 routes, the aggregate route mileage being 4,945, making its average motor coach route 95 miles in length. The motor coach lines of the Great Northern now cover the state of Minnesota like a blanket, and a few of them extend into surrounding states.

The Boston & Maine, one of the first railways to operate motor coaches, has also expanded its operations on the highways substantially during the past year. Its subsidiary, the Boston & Maine Transportation Company, now operates 74 motor coaches over 981 miles of routes. The Boston & Maine at the present time has 33 motor coach lines.

The Spokane, Portland & Seattle, the first steam railway in the United States to operate motor coaches, its

and Motor Truck Operation

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operations on the highways having begun in 1924, now has 35 motor coaches operating over 5 routes with an aggregate route mileage of 210 miles. This company, the highway subsidiary of which is the Spokane, Portland & Seattle Transportation Company, has established one additional motor coach route in each year since it began operation on the highways. Its newest line, established on May 1 of this year, extends from Portland, Ore., to Keasey, a distance of 71 miles.

Other railways which have made marked progress during the past year in establishing motor coach lines are the Reading, which recently secured the first of its motor coach operating certificates and has begun the operation of a number of routes; the Denver & Rio Grande Western, which has established an extensive motor coach and motor truck system in Colorado; the Atchison, Topeka & Santa Fe, which is operating a steadily increasing number of motor coaches in tour service in the country surrounding Santa Fe, N. M.; the Union Pacific, which has a rapidly growing motor coach tours system in Utah as well as several motor coach lines in Oregon and Washington; and the Southern Pacific, which has a large motor coach system in operation paralleling its lines in Oregon and is making headway in securing routes in California.

PROGRESS IN RAILWAY MOTOR TRUCK OPERATION

	1928	1927
Number of Roads Operating Trucks, Tractors and Trailers	45	31
Number of Trucks, Tractors and Trailers Operated	4,902	3,300
Number of Routes and Terminals Served	298	259
Aggregate Motor Truck Route Mileage	3,521	....

The New York Central is still the leading railway operator of motor trucks, its entire system, including lines and terminals, being practically covered by the motor truck, tractor and trailer operations for which it contracts. It is estimated that the New York Central now has approximately 1,500 motor trucks, tractors and trailers operating in its service.

The Pennsylvania has been going ahead rapidly with motor truck operation during the past year. Arranging for its motor truck, tractor and trailer service by contract with truck operators, the Pennsylvania now operates 57 motor trucks over 39 routes, aggregating 1,489 miles in length and serving 586 stations. At its various terminals it operates 485 trucks, 115 tractors and 688 trailers.

The Baltimore & Ohio, in addition to its motor truck line between Baltimore, Md., and Washington, D. C., operated by a subsidiary, contracts for motor truck service at virtually all of the large terminals on its system.

The Boston & Maine, through its subsidiary, the Boston & Maine Transportation Company, is operating motor trucks over eight routes, aggregating approximately 150 miles in length, and in four terminals. Its subsidiary now has 54 motor trucks, 12 tractors and 21 trailers.

The roads entering New York continue to operate motor vehicles on a large scale, trucking to and from "constructive" stations and inland stations, between the railroad stations in the terminal district, and in substitution for lighterage. It is estimated that 350 motor trucks, 45 tractors and 165 trailers are in regular service in the New York area for the Baltimore & Ohio, the Central of New Jersey, the Delaware, Lackawanna & Western, the Erie, the Lehigh Valley, the Long Island, the New York Central, the New York, New Haven & Hartford and the Pennsylvania. All of these operations are carried on under contract with independent truckmen. The Interstate Commerce Commission has just concluded a lengthy hearing in New York on the trucking practices of the railroads in that port. Some of the roads wish to curtail some features of the service; specifically, that involving direct collection and delivery service through a "constructive" station or lighterage point. Others wish to continue the "constructive" service; others favor trucking only between railroad points or to "inland" stations. The Port of New York Authority and representatives of important shipping and receiving interests favor both the inland stations and the direct collection and delivery—"store-door delivery". Voluminous testimony has been taken from all interests involved and counsel have until August 15 to file briefs. The examiner's proposed report which will follow, and the Commission's final ruling on the case, will of necessity have to settle many mooted questions regarding railroad use of motor vehicles in freight service; and principles which will have a country-wide significance in the railroad operation of motor trucks, tractors and trailers in terminal service.

The motor coach and motor truck operations of the various railways are described in detail in the following tabulations:

Railway Motor Coach Operations

Railway	Operating Company	No. of Motor Coaches Operated	Total Miles of Line	Routes Operated From	To	Miles	When Started
Alabama, Tennessee & Northern	Railway	2	5	Millry, Ala.	Bladon Springs	5	....
Amador Central	Railway	1	5	Martell, Cal.	Jackson	5	....
Atchison, Topeka & Santa Fe	Santa Fe Transportation Company	42	415	Lamy, N. M.	Santa Fe	18	1926
	Grand Canyon Transportation Company			Santa Fe, N. M.	Las Vegas	75	1926
				Santa Fe, N. M.	Albuquerque	65	1926
				Indian Detour, N. M.	.....	207	1926
				Grand Canyon Tours	.....	50	....
Atlanta, Birmingham & Coast	Railway	1	2	Fitzgerald, Ga.	Westwood	2	....
Atlantic Coast Line	Railway	2	5	Savannah, Ga.	Southover Shops	5	....
Baltimore & Ohio	Fifth Avenue Coach Company	26	67	Jersey City, N. J.	New York	5	....
	West Virginia Transportation Company			Jersey City, N. J.	Brooklyn	5	....
				Elizabeth, N. J.	Newark	10	....
				Clarksburg, W. Va.	Grafton	22	....
				Weston, W. Va.	Buckhannan	25	....
Boston & Maine	Boston & Maine Transportation Company	74	981	Boston, Mass.	Manchester, N. H. via Nashua	60	1925
				Boston, Mass.	Manchester, N. H. via Lawrence	58	1927
				Boston, Mass.	Keene, N. H.	85	1927
				Winchendon, Mass.	Peterboro, N. H.	18	1927
				Worcester, Mass.	Lowell	42	1927
				Ayer, Mass.	Lowell	16	1928
				Ayer, Mass.	Leominster	10	1927
				Wakefield, Mass.	Lynnfield	4	1925
				Franklin, N. H.	Bristol	14	1925
				Plymouth, N. H.	Lincoln	23	1925
				Ashburnham, Mass.	South Ashburnham	3	1926
				Nashua, N. H.	Wilton	16	1926
				Concord, N. H.	Eastside	3	1927
				Concord, N. H.	Contoocook	11	1925
				Boston, Mass.	Portland, Me.	112	1925
				Portsmouth, N. H.	Rye Beach	8	1925
				Exeter, N. H.	Hampton	8	1926
				Portsmouth, N. H.	Kittery, Me. (Navy Yard)	2	1926
				Portsmouth, N. H.	York Beach, Me.	13	1925
				Portsmouth City	via Middle Street	3	1925
				Portsmouth City	via Christian Shore	6	1925
				Dover, N. H.	Durham	6	1926
				Brattleboro, Vt.	Northampton, Mass.	48	1926
				Easthampton, Mass.	Mount Tom	4	1926
				Gardner, Mass.	Greenfield	40	1927
				Greenfield, Mass.	Shelburne Falls	11	1927
				Hoosick Falls, N. Y.	Walloonisac	4	1927
				Nashua, N. H.	Ayer, Mass.	25	1928
				North Adams, Mass.	Troy, N. Y.	43	1928
				Greenfield, Mass.	North Adams	38	1927
				Boston, Mass.	Bethlehem, N. H.	185	1925
				Concord, N. H.	Newport	43	1925
				York Beach, Me.	Kennebunk	19	1926
Cadiz Railroad	Railway	2	25	Cadiz, Ky.	Hopkinsville	25	....
Canadian Pacific	Canadian Pacific Transport Company	3	7	Galt, Ont.	Preston	5	1925
				Preston, Ont.	Blair	2	1926
Central of Georgia	Central of Georgia Motor Transport Company	1	12.5	Ft. Valley, Ga.	Perry	12.5	1928
Central of New Jersey	Jersey Central Transportation Company	12	42	Lakewood, N. J.	Barnegat	26	1927
	Grey Line Motor Tours			Lakewood, N. J.	Beechwood	11	1927
				Jersey City, N. J.	New York	5	1927
Chattahoochee Valley	Chattahoochee Valley Transportation Company	1	27	West Point, Ga.	Bleecher	27	....
Chesapeake & Ohio	Southland Transportation Company	5	10	Covington, Ky.	Stevens	10	....
Chicago & Alton	Alton Transportation Company	11	150	Jacksonville, Ill.	St. Louis, Mo.	90	....
				Joliet, Ill.	Wilmington	30	....
				Bloomington, Ill.	Pontiac	30	....
Chicago, Burlington & Quincy	Black Hills Transportation Company	10	200	Black Hills, S. D.	("Detour")	200	....
Chicago, Milwaukee, St. Paul & Pacific	Railway	7	118	Racine, Wis.	Sturtevant	8	....
				Lone Rock, Wis.	Richland Center	16	....
				Iron Ridge, Wis.	Fond Du Lac	27	....
				Tacoma, Wash.	Morton	67	....
Colorado & Southern	Denver & Interurban Transportation Company	17	159	Denver, Colo.	Boulder	40	1925
	D.-R. G.-P. Motorway, Inc.			Denver, Colo.	Pueblo	119	1926
Copper Range	Copper Range Motor Bus Company	8	84	Painesdale, Mich.	Lake Linden	22	....
				Hancock, Mich.	Ontonagon	62	....
Delaware Valley	Delaware Valley Transportation Company	5	13	East Stroudsburg, Pa.	Bushkill	13	....
Denver & Rio Grande Western	Denver-Colorado Springs-Pueblo Motorway	19	459	Denver, Colo.	Pueblo	119	1926
				Grand Junction, Colo.	Montrose	68	1926
	Western Slope Motorway			Delta, Colo.	Paonia	35	1927
				Delta, Colo.	Somerset	42	1927
	Rio Grande Motorway			Alamosa, Cal.	Salida	85	1927
				Alamosa, Cal.	Salida via Monte Vista	110	1927
Eastern Tennessee & Western North Carolina	Eastern Tennessee & Western North Carolina Transportation Company	6	96	Johnson City, Tenn.	Spruce Pine, N. C.	60	....
				Elk Park, N. C.	Blowing Rock	36	....
Fonda, Johnstown & Gloversville	.....	1	....	.....	.....	....	....
Fort Dodge, Des Moines & Southern	Fort Dodge, Des Moines & Southern Transportation Company	29	460	Boone, Ia.	Des Moines	43	1925
				Boone, Ia.	Ft. Dodge	47	1926
				Ames, Ia.	Des Moines	35	1925
				Ames, Ia.	Ft. Dodge	63	1927
				Ames, Ia.	Waterloo	100	1927
				Des Moines, Ia.	Ottumwa	92	1927
				Des Moines, Ia.	Indianola	18	1927
				Knoxville, Ia.	Monroe	16	1927
				Ft. Dodge, Ia.	Algona	46	1925
Georgia Railroad	.....	1	....	.....	.....	....	....
Graysonia, Nashville & Ashdown	.....	2	40	Nashville, Ark.	Ashdown	40	....
Great Northern	Northland Transportation Company	133	4,945	Minneapolis, Minn.	Duluth	163	....
				Minneapolis, Minn.	Taylors Falls	59	....
				Minneapolis, Minn.	Frederic	85	....
				Minneapolis, Minn.	Grantsburg	105	....
				Minneapolis, Minn.	Duluth (No. 35)	173	....
				Minneapolis, Minn.	Hinckley	91	....
				St. Cloud, Minn.	Hinckley	77	....
				Minneapolis, Minn.	St. Cloud	66	....

Railway	Operating Company	No. of Motor Coaches Operated	Total Miles of Line	Routes Operated From	To	Miles	When Started
Great Northern (Continued)				Minneapolis, Minn.	Long Prairie	130	....
				Minneapolis, Minn.	Wadena	173	....
				Minneapolis, Minn.	Bemidji	225	....
				Minneapolis, Minn.	Alexandria	140	....
				Minneapolis, Minn.	Fargo, N. D.	249	....
				Alexandria, Minn.	Pelican Rapids	77	....
				Fergus Falls, Minn.	Pelican Rapids	23	....
				Minneapolis, Minn.	Brainerd	130	....
				Minneapolis, Minn.	Aitkin	133	....
				Minneapolis, Minn.	Bemidji	225	....
				Minneapolis, Minn.	Long Lake	16	....
				Minneapolis, Minn.	Maple Plain	20	....
				Minneapolis, Minn.	Delano	28	....
				Minneapolis, Minn.	Willmar	98	....
				Minneapolis, Minn.	Madison	169	....
				Minneapolis, Minn.	Isle	103	....
				Minneapolis, Minn.	Hibbing	92	....
				Minneapolis, Minn.	Mound	23	....
				Minneapolis, Minn.	Auto Club	17	....
				Minneapolis, Minn.	Carver	32	....
				Minneapolis, Minn.	Mankato	84	....
				Minneapolis, Minn.	Fairmont	150	....
				Minneapolis, Minn.	Marshall via Olivia	160	....
				Minneapolis, Minn.	Springfield	133	....
				Minneapolis, Minn.	Marshall via Tracy	192	....
				Mankato, Minn.	New Ulm	29	....
				Hibbing, Minn.	Virginia	26	....
				Hibbing, Minn.	Gilbert	35	....
				Mountain Iron, Minn.	Virginia	5	....
				Virginia, Minn.	Gilbert	9	....
				Virginia, Minn.	Aurora	21	....
				Hibbing, Minn.	Grand Rapids	39	....
				Duluth, Minn.	Hibbing	92	....
				Duluth, Minn.	Bemidji	156	....
				Duluth, Minn.	Virginia	92	....
				Duluth, Minn.	Ely	116	....
				Duluth, Minn.	Two Harbors	27	....
				Duluth, Minn.	Grand Marais	110	....
				Duluth, Minn.	Pigeon River	150	....
				Duluth, Minn.	Cloquet	22	....
				Cloquet, Minn.	Carlton	6	....
				Duluth, Minn.	Proctor	8	....
				Duluth, Minn.	Fargo, N. D.	286	....
				Duluth, Minn.	Ashland	75	....
LaCrosse & Southeastern	LaCrosse & Southeastern Transportation Company	7	272	LaCrosse, Wis.	Madison	138	1926
				LaCrosse, Wis.	Preston, Minn.	68	1927
				LaCrosse, Wis.	Viroqua	35	1926
				La Farge, Wis.	Viroqua	31	1927
				LaCrosse, Wis.	Lanesboro, Minn.	40	1928
Little River	Railway	1	8	Townsend, Tenn.	Walland	8	....
Los Angeles & Salt Lake	Utah Parks Company	52	537	Cedar City, Utah	Lund	33	....
				Cedar City, Utah	Zion National Park	65	....
				Zion National Park	Grand Canyon	156	....
				Grand Canyon	Bryce Canyon	164	....
				Cedar City	Bryce Canyon	94	....
				Cedar City	Cedar Breaks	25	....
Maine Central	The Samoset Company	5	65	Portland, Me.	Harrison	45	1925
				Ellsworth, Me.	Bar Harbor	20	1926
McCloud River	.....	1	17	McCloud, Cal.	Mt. Shasta	17	....
Middletown & Unionville	Middletown & Sussex Transit Corporation	2	22	Middletown, N. Y.	Sussex, N. J.	22	1926
Minnesota Western	Railway	4	30	Minneapolis, Minn.	Watertown	30	....
Missouri-Kansas-Texas	Railway	3	....	.....	.....	....	....
Missouri Pacific	Frank D. Hequembourg	1	14.7	Cairo, Ill.	Charleston, Mo.	14.7	1927
Nashville, Chattanooga & St. Louis	Nashville, Chattanooga & St. Louis Motor Transit Company	3	61	Cowan, Tenn.	Monteagle	13	1926
				Cowan, Tenn.	Tracy City	20	1926
				Cowan, Tenn.	Coalmont	28	1926
Nevada Central	Nevada Central Motor Lines, Inc.	9	330	Reno, Nev.	Fallon	64	1927
				Fallon, Nev.	Ely	266	....
Nevada Northern	Davidson Auto Bus Company	1	4.4	East Ely, Nev.	Ely	4.4	1923
New York Central	Railway	5	20	Albany, N. Y.	Ravenna, Selkirk Yard	20	....
New York, New Haven & Hartford	New England Transportation Company	254	1,767	Ridgefield, Conn.	Branchville	4.4	1925
				Whitman, Mass.	Bridgewater	6.8	1925
				Brockton, Mass.	North Easton	15.7	1925
				Hope, R. I.	River Point	2.9	1925
				Wickford, R. I.	Wickford Junction	3.0	1925
				New Haven, Conn.	Willimantic	57.0	1925
				Danbury, Conn.	Canaan	59.7	1925
				New Haven, Conn.	Sibsbury	42.2	1925
				Providence, R. I.	Willimantic	45.0	1925
				Hartford, Conn.	Northampton, Mass.	50.0	1925
				Brockton, Mass.	New Bedford	36.6	1925
				So. Braintree, Mass.	North Easton	14.8	1925
				Providence, R. I.	Worcester, Mass.	42.7	1926
				Providence, R. I.	Bristol	17.5	1926
				Providence, R. I.	Norwich, Conn.	52.1	1926
				Worcester, Conn.	Fitchburg, Mass.	25.0	1926
				Fall River, Mass.	Taunton	15.9	1926
				North Easton, Mass.	Canton Junction	9.2	1926
				New Haven, Conn.	Hartford	37.5	1926
				New Haven, Conn.	Danbury	41.1	1926
				Danbury, Conn.	South Norwalk	24.2	1926
				Norwich, Conn.	New London	13.8	1926
				Norwich, Conn.	Willimantic	16.1	1926
				Hartford, Conn.	Suffield	21.0	1926
				Willimantic, Conn.	Putnam	28.3	1926
				Hartford, Conn.	Springfield, Mass. (East Side)	29.2	1926
				Boston, Mass.	Providence, R. I.	45.0	1926
				Hyannis, Mass.	Chatham	20.0	1926
				Hyannis, Mass.	Plymouth	36.1	1926
				Hartford, Conn.	Middletown	20.0	1926
				Hyannis, Mass.	Woods Hole	29.0	1926
				Brockton, Mass.	Plymouth	26.3	1926
				Brockton, Mass.	Nantasket	22.3	1926
				Hyannis, Mass.	Provincetown	48.5	1926
				Hyannis, Mass.	New Bedford	47.3	1926
				Fall River, Mass.	Warren	10.6	1926
				Hartford, Conn.	Willimantic	28.1	1926

Railway	Operating Company	No. of Motor Coaches Operated	Total Miles of Line	Routes Operated From	To	Miles	When Started
New York, New Haven & Hartford (Continued)				Willimantic, Conn.	Bolton	15.5	1926
				North Scituate, R. I.	Rice City	12.9	1927
				Hartford, Conn.	Winsted	27.0	1927
				Winsted, Conn.	Canaan	18.0	1927
				Hartford, Conn.	Torrington	28.5	1927
				Boston, Mass.	New York (Shore Line)	237.0	1927
				Hartford, Conn.	Waterbury	31.5	1927
				Canaan, Conn.	Millerton	12.3	1927
				Hartford, Conn.	Collinsville	19.6	1927
				New Britain, Conn.	Collinsville	16.6	1927
				Winsted, Conn.	Pittsfield	46.8	....
				Hartford, Conn.	Stafford	31.5	....
				New Haven, Conn.	New York	77.0	1928
				Hartford, Conn.	Springfield, Mass. (West Side)	27.7	1928
				Somerset, Mass.	Springfield, Mass.	17.8	1928
				Rockville, Mass.	Phelps Corner	14.5	1928
				New Haven, Conn.	Waterbury	23.5	1928
				Providence, R. I.	Fall River, Mass.	19.8	1925
				Providence, R. I.	North Attleboro, Mass.	14.2	1925
				Hingham, Mass.	Hull	8.5	1925
				Providence, R. I.	Attleboro, Mass.	12.3	1926
				Woonsocket, R. I.	Millville, Mass.	4.1	1926
Norfolk Southern	Norfolk Southern Bus Corporation	4	25	Norfolk, Va.	Virginia Beach	25	1926
Oregon-Washington Railroad & Navigation Company	Union Pacific Stages	6	368	Portland, Ore.	Pendleton	231	1927
				Pendleton, Ore.	Walla Walla, Wash.	46	1925
				Portland, Ore.	The Dalles	91	1928
Pacific Electric	.....	116	....	32 routes in vicinity of Los Angeles		....	....
Pajaro Valley Consolidated	Railway	2	5	Spreckles, Cal.	Salinas	5	....
Paris & Mt. Pleasant	Railway	1	50	Paris, Tex.	Mt. Pleasant	50	....
Pennsylvania	Contractors	8	100	.....	.....	....	....
Quebec, Montreal & Southern	Railway	3	81	Sorel, Que.	St. Lambert and St. Hyacinthe	81	....
Reading	Reading Transportation Company	14	201	Jenkintown, Pa.	New Hope	25	....
				Lansdale, Pa.	Dolyestown	12	....
				Langhorne, Pa.	Doylestown	19	....
				Pottstown, Pa.	Bally	13	....
				Milton, Pa.	West Milton	1	....
				Carlisle, Pa.	Gettysburg	29	....
				Carlisle, Pa.	Shippensburg	23	....
				Pottsville, Pa.	Shenandoah	12	....
				Mahanoy City, Pa.	Ashland	12	....
				Atlantic City, N. J.	Cape May	55	....
Rutland	Rutland Transportation Corporation	2	67	Bennington, Vt.	Chatham, N. Y.	67	1926
San Francisco, Napa & Calistoga	Napa Valley Bus Company	2	42	Napa, Cal.	Vallejo	15	1927
				Napa, Cal.	Calistoga	27	1927
St. Louis-San Francisco	Railway	1	5	Fort Smith, Ark.	Shops	5	....
St. Louis Southwestern	W. E. Nunnelee Bus Lines	7	120	Tyler, Tex.	Lufkin	92	1928
				Alto, Tex.	Nacogdoches	28	1928
San Joaquin & Eastern	.....	4	11	Big Creek, Cal.	Huntington Lake	11	....
Seaboard Air Line	Motor Transportation Company of the South	7	301	Rutherfordton, N. C.	Boone	125	....
				Rutherfordton, N. C.	Lake Lure	25	....
				Savannah, Ga.	West Savannah	10	....
				Wildwood, Fla.	Orlando	60	....
				Jacksonville, Fla.	Live Oak	81	....
Southern	Railway	2	5	Knoxville, Tenn.	John Sevier	5	....
Southern Pacific	Southern Pacific Motor Transport Company	52	1,312	Portland, Ore.	Ashland	329	1927
				Portland, Ore.	Roseburg	205	1927
				Portland, Ore.	Eugene	130	1927
				Portland, Ore.	Corvallis	89	1927
				Portland, Ore.	Salem	52	1927
				Portland, Ore.	Corvallis	84.1	1927
				Portland, Ore.	Hillsboro	19.8	1927
				Portland, Ore.	Forest Grove	25.9	1927
				Portland, Ore.	Cook	13	1927
				Grants Pass, Ore.	Eureka, Cal.	183	1927
				Medford, Ore.	Weed, Cal.	89	1927
				Reno, Nev.	Truckee, Cal.	38	1927
				Boulder Creek, Cal.	Santa Cruz	15.9	1927
				Boulder Creek, Cal.	Felton	7.0	1927
				Santa Rosa, Cal.	Napa	34.6	1928
				Salem, Ore.	.....	....	....
				Eugene, Ore.	.....	....	....
Spokane, Portland & Seattle	Spokane, Portland & Seattle Transportation Company	35	210	Portland, Ore.	Seaside	128.6	1924
				Warrenton, Ore.	Fort Stevens	3.8	1925
				Woodburn, Ore.	West Woodburn	2.9	1926
				Portland, Ore.	Mt. Calvary Cemetery	6.2	1927
				Portland, Ore.	Keasey	71.4	1928
Tennessee & North Carolina	Railway	1	21	Crestmont, N. C.	Newport Junction	21	....
Tennessee, Kentucky & Northern	Railway	2	19	Livingston, Tenn.	Algood	19	....
Texas & Pacific	.....	1	3	Ft. Worth, Tex.	Shops	3	....
Verde Tunnel & Smelter	Verde Valley Stage Company	1	6	Clarkdale, Ariz.	Jerome	6	1926
Virginia & Truckee	Virginia & Truckee Railway Reno-Virginia Transportation Company	4	68	Reno, Nev.	Virginia City	22	1925
				Reno, Nev.	Minden	46	1928
Wheeling & Lake Erie	.....	2	....	.....	.....	....	....
Yreka Railroad	Railway	1	8	Yreka, Cal.	Montague	8	....

Railway Motor Truck Operations

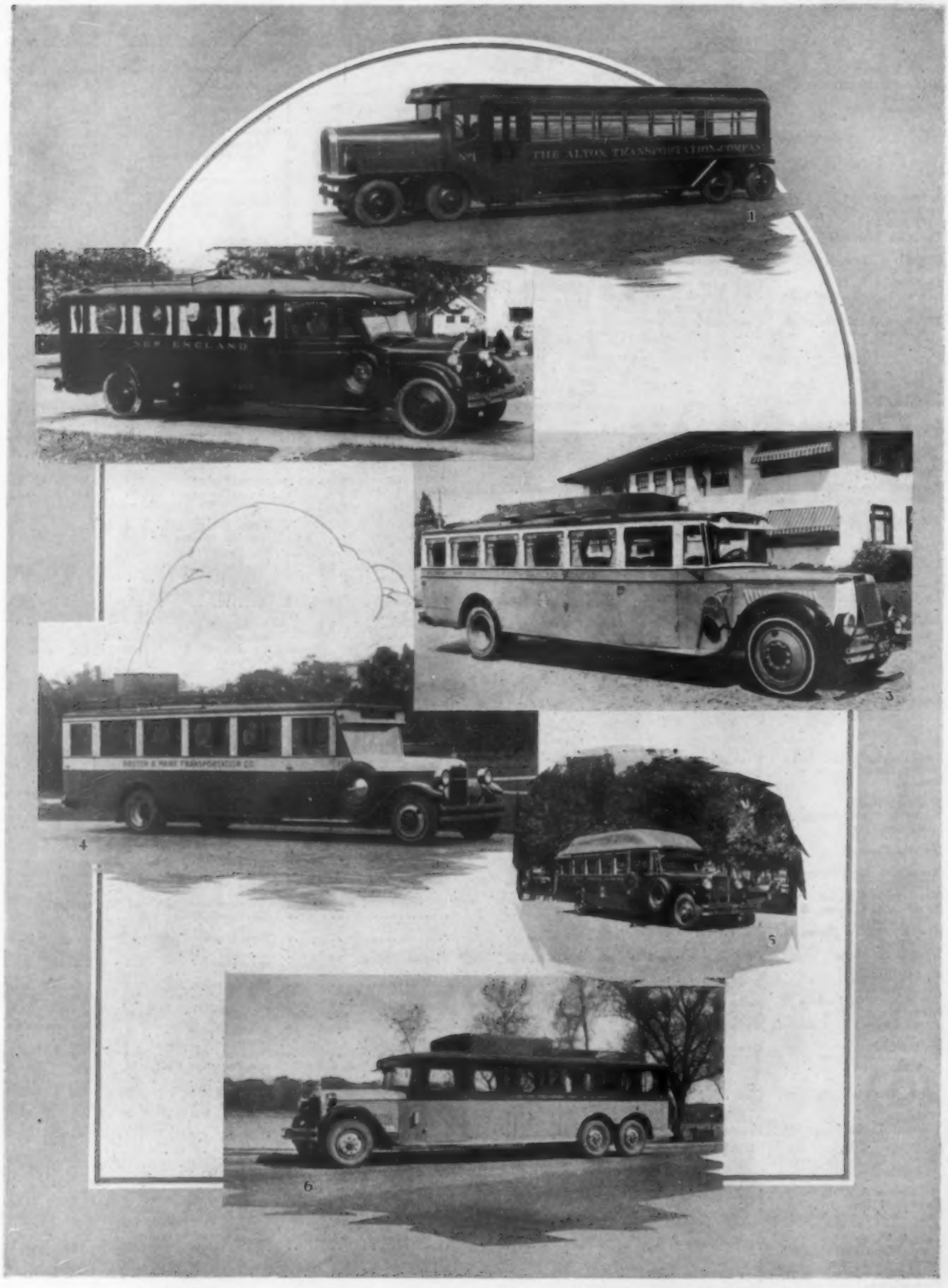
Railway	Operating Company	Line Service From	To	Miles	No. of Trucks	Terminal Service Location	Number of Trucks	Tractors	Trailers
Ann Arbor	Contractor	.....	.....	..	..	Toledo, Ohio	...	2	5
Atchison, Topeka & Santa Fe	Santa Fe Transportation Co., and Contractor	Santa Fe, N. M.	Lamy	19	3	Oakland, Cal.	...	10	60
						Santa Fe, N. M.	1	...	...
Atlantic Coast Line	Contractors	.....	.....	..	..	Norfolk, Va., and 7 other terminals	10	...	...
Baltimore & Ohio	Blue Line Transfer and Contractors	Baltimore, Md.	Washington, D.C.	40	2	Baltimore, Md. New York Philadelphia, Pa. Pittsburgh, Pa. Akron, Ohio Cleveland, Ohio	All by contract except Baltimore. Number of units varies with need. Estimated at 200.		

Railway	Operating Company	Line Service: From	To	Miles	No. of Trucks	Terminal Service: Location	Number of Trucks	Tractors	Trailers
Baltimore, Chesapeake & Atlantic	Railway	Cambridge, Md.	Salisbury	40	2	Cincinnati, Ohio St. Louis, Mo.			
Boston & Maine	Boston & Maine Transportation Company	Boston	Lawrence	28	2	Boston	19	12	21
		Boston	Lowell	28	5	Lawrence	6	...	...
		Lowell	Lawrence	10	6	Lowell	6	...	...
		Lawrence	Newburyport	22	1	Lawrence	4	...	...
		Lawrence	Haverhill	10	1	suburban stations			
		Concord	Newport, N. H.	42	2	.....	...	...	...
		Lynn, Mass.	Swampscott	2	1	.....	...	...	...
		W. R. Jct., Vt.	Westboro, N. H.	1	1	.....	...	...	...
Bristol Railroad	Railway	.....	.....	..	..	Rutland, Vt.	1	...	...
Buffalo, Rochester & Pittsburgh	J. Michael, Le Roy, N. Y.	Le Roy	Rochester	30	1	.....	...	...	...
		Le Roy	Gainesville	32	1	.....	...	...	...
Canadian National	Canadian National Transfer Company	.....	.....	..	..	Montreal, Que., and other points	200	...	...
Central of New Jersey	Jersey Central Transportation Company	Red Bank, N. J.	Point Pleasant	21	1	.....	...	...	...
Chesapeake & Ohio	Contractor	Cincinnati, Ohio	Cheviot	8	5	.....	...	...	...
Chicago, Rock Island & Pacific	Rock Island Motor Transit Company	.....	.....	..	..	Chicago	...	1	4
Delaware, Lackawanna & Western	Contractors	.....	.....	..	..	Hoboken, N. J. Cortland, N. Y. Mount Morris, N.Y. Norwich, N. Y. Oswego, N. Y. Owego, N. Y. Syracuse, N. Y.	50	3	7
Denison, Bonham & New Orleans	Ellis Roberts	Denison, Texas	Bonham	40	1	.....	...	...	...
Denver & Rio Grande Western	Western Slope Motorway	Grand Jct., Colo.	Somerset	60	5	.....	...	...	...
	Rio Grande Motorway	Alamosa, Colo.	Salida	85	4	.....	...	...	...
		Alamosa, Colo.	Salida via Monte Vista	110					
Detroit & Mackinac	Railway	.....	.....	88	1	.....	...	...	...
Eastern Tennessee & Western North Carolina	Eastern Tennessee & Western North Carolina Transportation Company	Johnson City, Tenn.	Elizabethtown	20	2	.....	...	...	...
Emmitsburg Railroad	Railway	.....	.....	..	..	Emmitsburg, Md.	1	...	...
Erie	Contractors	.....	.....	..	..	Various terminals	56	15	58
Great Northern	Contractor	.....	.....	..	..	St. Paul, Minn.	...	3	17
Indiana Harbor Belt	Quick Service Express Company	Gibson Transfer, Gibson, Ind.	Calumet Station, E. Chicago, Ind.	2.8	3	Gibson Transfer, Gibson, Ind.	...	3	218
						Blue Island, Ill.	1	...	...
La Crosse & Southeastern	La Crosse & Southeastern Transportation Company	Viroqua, Wis.	La Farge	59	1	.....	...	...	...
Lehigh Valley	Railway and Contractors	Canastoga, N. Y.	Oneida, N. Y.	6.5	..	Buffalo, N. Y. Rochester, N. Y. Camden, N. Y. Cortland, N. Y. Jersey City, N. J.	50	...	...
						Wilkes-Barre, Pa.	1	...	...
						Easton, Pa.	1	...	...
Long Island	Motor Haulage Company	Long Island City	Port Washington, L. I.	66.6	2	Brooklyn, N. Y.	...	5	29
		Valley Stream, L. I.	Hammel, L. I.	30.0	1	.....	...	...	...
		Mineola, L. I.	Oyster Bay, L. I.	28.8	1	.....	...	...	...
Los Angeles & Salt Lake	Utah Parks Company	Cedar City, Utah	Grand Canyon	300	6	.....	...	...	...
Maine Central	Samoset Company	Bangor, Me.	Bar Harbor, Me.	47	5	.....	...	...	...
Michigan Central	Contractors	Detroit, Mich.	Monroe	10	..	.....	...	...	...
		Battle Creek, Mich.	Niles	10	..	.....	...	...	...
Missouri Pacific	Frank D. Hequembourg	Cairo, Ill.	Charleston, Mo.	14.7	1	.....	...	...	...
Nashville, Chattanooga & St. Louis	Nashville, Chattanooga & St. Louis Motor Transit Company	Cowan, Tenn.	Coalmont, Tenn.	27.8	2	.....	...	...	...
Nevada Central	Nevada Central Motor Lines, Inc.	Reno, Nev.	Fallon	64	2	.....	...	...	...
		Fallon, Nev.	Ely	266	4	.....	...	...	...
Nevada County Narrow Gage	Railway	Nevada City, Nev.	Colfax	20	1	.....	...	...	...
New York Central	Contractors	Operating 1,500 trucks, tractors and trailers in one hundred terminals and line sections.							
New York, Chicago & St. Louis	Contractor	.....	.....	..	..	Cleveland, Ohio	...	3	9
New York, New Haven & Hartford	Contractors	.....	.....	..	..	New Haven, Conn.	20 units of all kinds		
Norfolk Southern	Norfolk Southern Bus Corporation	Norfolk, Va.	Virginia Beach	25	1	.....	...	...	...
Pacific Electric	Railway	.....	.....	..	..	Los Angeles, Cal.	33	...	...
Pennsylvania	Contractors	39 routes serving 536 stations		1,489	57	Various terminals	485	115	688
San Joaquin & Eastern	Railway	Big Creek, Cal.	Huntington	11	2	.....	...	...	...
Santa Maria Valley	Bradley Truck Company	Santa Maria, Cal.	.....	200	17	.....	...	...	...
Sierra Railway of California	Railway	Stockton, Cal.	Sonora	68.5	2	Stockton, Cal.	1	...	...
						Jamestown, Cal.	1	...	...
Southern Pacific	Contractors	.....	.....	..	..	Oakland, Cal.	...	6	60
						San Francisco, Cal.	10	...	...
						Los Angeles, Cal.	10	...	...
						Portland, Ore.	5	...	...
Verde Tunnel & Smelter	Chas. Ewing	Clarkdale, Ariz.	Jerome	6	2	.....	...	...	...
Virginian	Pitzer Transfer Company	.....	.....	..	..	Roanoke, Va.	2	...	...
Wabash	Arthur Dixon & Company	.....	.....	..	..	Chicago	...	4	11
Western Pacific	Contractor	.....	.....	..	..	Oakland, Cal.	...	10	60

New York Terminal Operations*

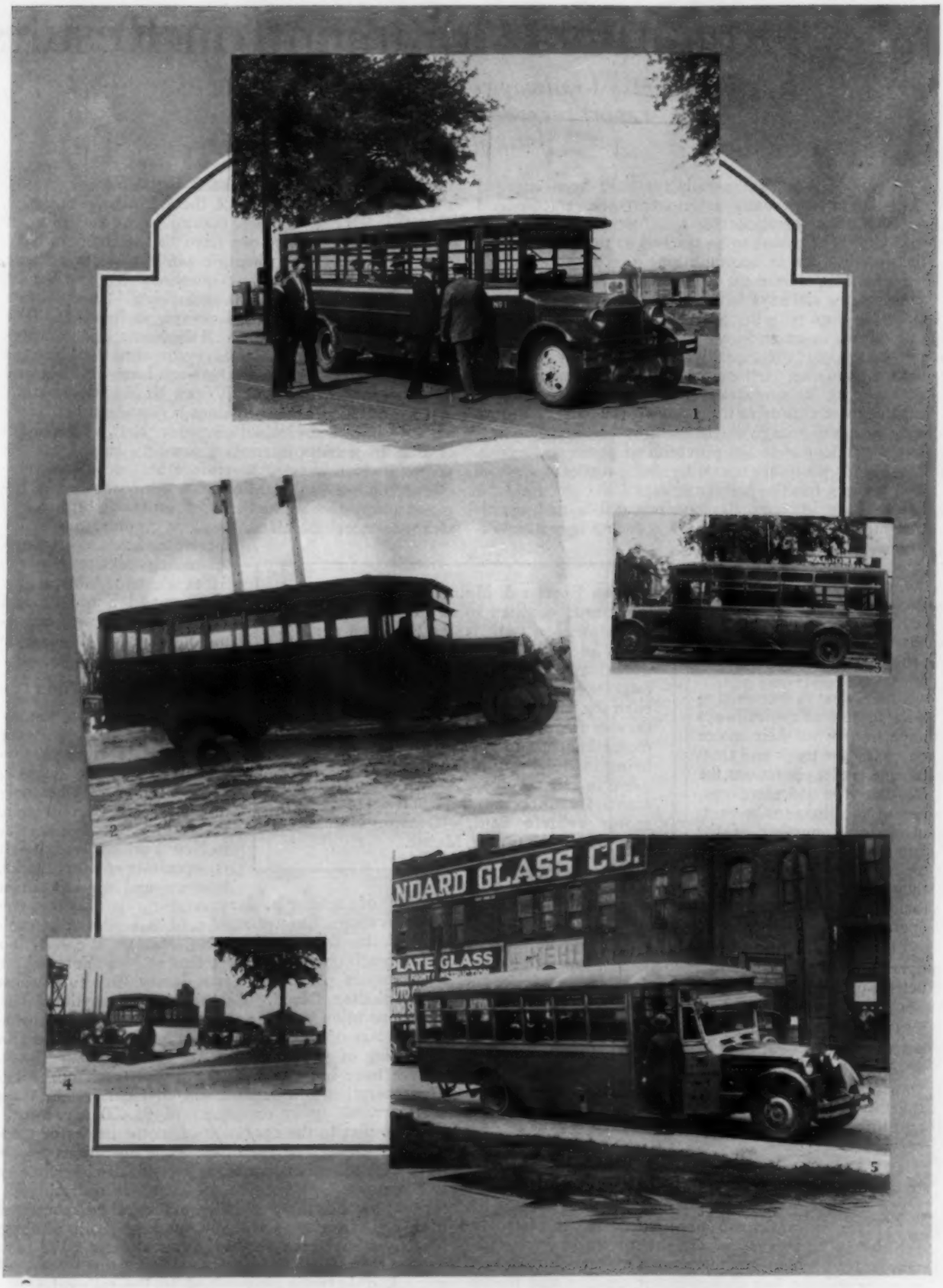
*Baltimore & Ohio Central of New Jersey Del., Lackawanna & Western Erie Lehigh Valley Long Island New York Central N. Y., New Haven & Hart. Pennsylvania	Contractors	.....	.....	..	..	New York	350	45	165

* All the roads listed use trucks, tractors and trailers in New York terminal freight service, the various uses being (1) trucking to and from "constructive" stations, (2) to and from inland stations, (3) between railroad stations in the terminal district, and (4) trucking in lieu of lighterage. Not all the roads use highway vehicles in all the services, however. The operations are carried on entirely under contract, hence much of the equipment is used by more than one road, or both in railroad and private trucking service. The totals given, arrived at from information from railroad and other authoritative sources, are the best available estimates of the average number of vehicles working at any one time in railroad terminal service in the New York district.



A Few of the Motor Coaches Operated by Railroad Subsidiaries

1. A Versare Coach in Service on the Alton
2. One of the New Haven's Coaches
3. A Mack Parlor Coach Owned by the Union Pacific
4. One of the Boston & Maine's Yellow Coaches
5. A White in Service on the Santa Fe
6. One of the Northland's Six-Wheel Coaches



Motor Coaches Used for Transporting Employees

1. A Mack on the Atlantic Coast Line at Savannah
2. One of the New York Central's Pierce-Arrows at Selkirk
3. An A. C. F. at Savannah on the Seaboard Air Line
4. Transporting C. & O. Employees at Covington
5. A White Running Between Knoxville and John Sevier Terminal, Southern Ry.

Executives Comment on Results o

Presidents of railways operating motor vehicles report increased passenger and freight traffic

A NUMBER of the railways have been engaged in motor coach or motor truck, tractor and trailer operations for a sufficient length of time to permit conclusions to be reached as to the success of these operations in accomplishing the purposes which led to the establishment of the motor vehicle service. Some of the railways have engaged in the operation of motor coaches with the purpose of supplementing their rail service in an endeavor to recover passenger traffic previously lost to competitive motor coaches or to private automobiles. Others have established motor coach service with its comparatively small operating cost to replace more expensive train service, the purpose in such cases being to a large extent merely to reduce operating expenses incident to the provision of passenger service. Most roads which are operating motor trucks or tractors and trailers for the handling of l.c.l. freight, either in line hauls or in terminals, have engaged in such operation largely for the purpose of reducing operating expenses connected with the handling of such traffic. On the other hand, some have operated motor vehicles for l.c.l. freight in an effort to recover traffic lost to competitive motor truck freight lines.

With a view to determining how successful the railways have been with their motor coach, motor truck and tractor and trailer operations, the *Railway Age* addressed a series of questions to the executives of a number of the principal roads operating motor vehicles, requesting that they make public through their replies the results that they are obtaining from such operations. The questions asked were as follows:

(1) What have been the results of your motor coach operations with respect to reductions in operating expenses incident to the provision of passenger service?

(2) To what extent have your motor coach operations recovered passenger traffic previously lost to competitive motor coach lines or to private automobiles?

(3) What economies, if any, have been effected by your highway motor trucks or tractor and trailer operations in connection with the handling of l. c. l. freight; and to what extent have such operations expedited this service?

(4) Has there been any recovery of l. c. l. freight business from competitive motor truck lines as the result of your own motor truck operations?

(5) Do you anticipate more extensive use of motor vehicles in passenger and freight service by your railway? If so, what are the classes of service to which your experience has shown motor coaches and trucks are best adapted?

The replies to these inquiries which have been received are abstracted below.

"The Boston & Maine has now been using motor coaches in substitution for and in connection with its rail service for 4½ years and has found the motor coach very useful as an aid to making economies in rail service. . . . In many instances it is entirely possible to render an adequate service for present day needs by use of the motor coach, and substantial economies are being made through the elimination of expensive rail service. . . . We expect to substantially increase our activities in the motor vehicle field."—George Hannauer, president, Boston & Maine.

Atchison, Topeka & Santa Fe

W. B. Storey, president of the Atchison, Topeka & Santa Fe, felt that "as these operations are all still in an experimental stage and we have had a comparatively short experience with them, it would be impracticable to furnish replies to your questions from which it would be safe to draw any conclusions." He describes the Santa Fe's operations, however, as follows: "We have arranged by contract with the Santa Fe Transportation Company (a Fred Harvey organization) for the operation of motor coaches between Lamy, N. M., and Santa Fe, and between Las Vegas, N. M., Albuquerque and Santa Fe. These operations began about two years ago and have a three-fold purpose: first, to make accessible to tourists interesting territory back from the railroad which has not heretofore been readily accessible; second, the substitution of motor coach service between Lamy and Santa Fe for unprofitable branch line steam service; and, third, the same organization is also furnishing a commercial motor coach service between Santa Fe and Albuquerque and between Santa Fe and Las Vegas, thus supplementing the existing train service."

Baltimore & Ohio

The Baltimore & Ohio, although it has been trying for some time to establish several motor coach lines in West Virginia, still has only one motor coach operation, the train connection service in New York and vicinity. It is operating motor trucks, tractors and trailers in a number of terminals, however, and it also has one line operation of motor trucks. Daniel Willard, president of the Baltimore & Ohio, states, "We have no motor coach operation except that at New York where we transport passengers from Jersey City to stations on Manhattan Island. As this is an exceptional terminal operation we are assuming that it does not come in the class of motor coach service which is meant in the asking of your question.

"We have but one highway motor truck operation. This operation is a replacement of local freight train service resulting in economies of $1,400 per month. With respect to the operation of motor trucks or tractors and trailers in terminals, such operations as we have were placed in service, as a result of either one or two reasons: first, because of savings in operating expenses; second, the possibility of expedited movement of l. c. l. freight. Generally speaking, both of these objectives have been obtained at such places. We have by their installation in terminal operation recovered some l. c. l. traffic or retained to the railroad traffic which might have been lost.

"We are making continuous study into the adaptability of motor coaches and trucks, and it is our purpose

# of Motor Coach and Truck Operation

Operating expenses are reported reduced—Difficulties are encountered in establishing new service

to extend their use wherever it is possible and conditions justify."

Boston & Maine

The Boston & Maine is a pioneer operator of motor coaches and trucks. Through its subsidiary, the Boston & Maine Transportation Company, it is operating a large system of motor coach routes in its territory and has recently established a number of motor truck lines. George Hannauer, president of the Boston & Maine, writes on the results it has obtained from motor vehicle operation, as follows:

"The Boston & Maine has now been using motor coaches in substitution for and in connection with its rail service for four and one-half years and has found the motor coach very useful as an aid to making economies in rail service. This railroad has many branch lines where the volume of passenger traffic is exceedingly light and private automobiles have taken most of the business that formerly was done on these lines. In many instances it is entirely possible to render an adequate service for present day needs by use of the motor coach, and substantial economies are being made through the elimination of expensive rail service.

"Last year, on all motor coach lines operated, the revenues exceeded the total cost of providing the service by a small margin; at the same time the railroad benefited from a very substantial reduction in what would have been the cost of providing the service by rail through the reduction or entire elimination in some instances of rail service.

"The railroad now has the matter of interstate motor coach traffic in its territory fairly well in hand through the operation of motor coaches in its own interest on lines where such service is at all needed. It is difficult to say just how much of the traffic diverted to the private automobile has been recovered by the motor coach. Our studies of the situation indicate that this has been done only to a very limited extent.

"We have been very successful in the use of motor trucks as a means of concentrating l. c. l. freight at central points for loading through cars and also for transferring freight between freight houses of our own and foreign lines. Such operations have made possible the loading of through cars not otherwise possible and have otherwise expedited the service. The concentrating of freight into through cars has recovered some freight from competitive motor truck lines.

"We expect to increase our activities substantially in the motor vehicle field. Further economies can be made on branch lines where the passenger business is steadily shrinking and by means of the motor coach we will be able to continue an organized transportation service for these people where with rail service it would be impossible to do so. We expect to continue our activities with the motor truck along the same lines as at present and to make further improvements in service and economies in operation."

"This (motor truck) operation is a replacement of local freight train service, resulting in economies of $1,400 per month."—Daniel Willard, president, Baltimore & Ohio.

"Our figures show that there has been considerable economy secured in the handling of our business in this manner (by tractor and trailer), compared with trap car operation, and it has permitted us to make more prompt delivery of freight."—J. E. Gorman, president, Chicago, Rock Island & Pacific.

Central of Georgia

A few months ago the Central of Georgia discontinued passenger train service on one of its branch lines in Georgia, operating instead a combination freight and passenger motor coach. J. J. Pelley, president of the Central of Georgia, reports on this operation, as follows:

"We operate only one motor coach, which is a combination passenger and express unit, running between Perry, Ga., and Fort Valley. The savings per month average $600 by reason of the reduced cost of motor coach operation as compared with the cost of steam train operation. There has been no recovery of passenger traffic on the one motor coach that we have been operating.

"We have several points at which we contemplate using passenger motor coaches, but do not contemplate any freight service."

Chicago, Milwaukee, St. Paul & Pacific

Until recently the Chicago, Milwaukee, St. Paul & Pacific had only one motor coach route. Lately, however, it has put several additional lines in service. Commenting on the results of its motor coach operations, H. A. Scandrett, president of the Milwaukee, says, "We substituted motor coach service for an arbitrary patrol service between Racine, Wis., and Sturtevant by negotiating with an established motor coach line to handle our passengers, which made it possible for us to reduce our force an equivalent of 1½ train crews. We also substituted motor coach service between Lone Rock, Wis., and Richland Center, and between Iron Ridge, Wis., and Fond du Lac, saving one train crew on each division. Between Tacoma, Wash., and Morton, we arranged with an established motor coach line for service in lieu of our regular train, saving one crew.

"We have not established any motor coach service with a view to recovering passenger business. The change from steam train to motor coach service was made in order to save operating expenses; but where arrangements have been made with established motor coach lines we believe that such lines, acting as our agents, will bring additional traffic to the railroad. We have not established any truck service in connection with the handling of l. c. l. freight.

"We propose to continue the practice of substituting motor coach service for passenger trains in territory where concrete highways are constructed and there is

greater use made of automobiles between common points. In the sparsely settled sections we believe it to be more economical to arrange with established motor coach lines to handle our business than to operate in competition with them. On many of the branch lines that we operate, there is need for railroad freight service and at present there would be no economy in changing from the rail service to motor truck service."

Chicago, Rock Island & Pacific

For several years the Chicago, Rock Island & Pacific has been using tractors and trailers between several of its freight stations in the Chicago area. With respect to the results obtained from their operations, J. E. Gorman, president of the Rock Island, states, "The Rock Island lines for some time have been operating experimentally one 10-ton tractor with four semi-trailers for handling l. c. l. freight between their Taylor street, Chicago, freight station and their freight stations at Blue Island, Ill., also serving four intermediate stations, such vehicles being used in place of trap cars. During 1927, these vehicles handled a total of 15,418,-922 lb. of freight. The tractor made 25,239 miles during the year, the average consumption of gasoline being 3.24 miles per gallon.

"Our figures show that considerable economy has been secured in the handling of our business in this manner, as compared with trap car operation, and it has also permitted us to make more prompt delivery of freight, as under this operation we are able to forward all freight toward its proper destination on the same day that it is received. The tonnage handled by these vehicles during 1927 was approximately 15 per cent more than that handled during the previous year. Some of this increase can be attributed to the service rendered.

"Study has been made of the possibility of use of similar vehicles in other service, but as yet no definite conclusions have been reached."

Great Northern

A subsidiary of the Great Northern, the Northland Transportation Company, has the most extensive system of motor coach lines of any railway in the United States. Its motor coach routes now aggregate nearly 5,000 miles in length. Ralph Budd, president of the Great Northern, comments on the results obtained from its motor coach operations, as follows:

"The operation of motor coaches in Minnesota by the Great Northern has made it possible, not only for the Great Northern but for the other railroads also, to reduce passenger train service which was being operated at a loss. The increase in travel by the Northland Transportation Company's motor coaches has been about 25 per cent, practically all of which, in our opinion, has come from previous users of private automobiles. The Great Northern has not at present any intention of extending the use of motor coaches of the Northland Transportation Company or of entering upon truck service.

"In addition to the information brought out by your questions, an important thing is that by purchasing and consolidating several motor coach companies into the Northland Transportation Company, we have been able to reduce substantially the number of motor coach runs in several cases where there was an unnecessary amount of competition and at the same time correlate the remaining motor coach schedules with the remaining passenger train schedules in such a way as to give the public more service with a great many less train and motor coach miles."

Maine Central

The experience of the Maine Central in the operation of motor coaches and trucks has been along the following lines, according to Morris McDonald, president of this company. "In one territory we put on motor coach and truck service in connection with a narrow gage railroad, a subsidiary of this company. The truck service did not prove satisfactory and was discontinued. The motor coach service has allowed some reduced passenger train service and some passenger travel lost to the rail lines was picked up by this service. In another territory on our line the operation of motor trucks has allowed no reduction in train mileage, but through this service we have recovered some small package freight handled by independent truckers. The motor coach service, which is in addition to passenger train service, has a limited patronage, and we consider this operation still in experimental form."

Nashville, Chattanooga & St. Louis

The Nashville, Chattanooga & St. Louis, through a subsidiary, the N. C. & St. L. Motor Transit Company, operates motor coaches and motor trucks, the latter to handle mail, baggage and express, in replacement of passenger service on a branch line in Tennessee. The results that it has obtained from this operation have not been particularly satisfactory, according to J. B. Hill, president of the railway. Mr. Hill says, "We operate motor coach service between Cowan, Tenn., and Coalmont, a distance of 27 miles, which replaced and is in substitution for passenger train service. At the time passenger train service was discontinued, the losses therefrom were substantial. Motor coaches can be operated at so much less cost than the passenger train service, that it was at that time believed that we could make the motor coach operation pay its way.

"In the meantime, however, roads in the territory have been considerably improved and further losses of traffic have ensued as the result of the general use of private automobiles and also as the result of the operation of competitive motor coach lines in this territory. As a consequence, the revenues accruing to our motor coaches have fallen so low that our losses in this short operation are substantial."

New York, New Haven & Hartford

The New York, New Haven & Hartford, through its subsidiary, the New England Transportation Company, has the largest fleet of motor coaches of any American railway. During the past three years, it has established an extraordinarily large number of motor coach routes with the following results, as stated by E. G. Buckland, vice-president of the railway:

"Considerable economies have been brought about in the last few years through constant endeavor to readjust our passenger train service to meet the changing demands of the public, by operation of highway motor coaches and rail motor cars and by the elimination of local stops on passenger trains, with consequent improvement in our steam passenger service generally. There are, however, so many angles to the situation that it is a practical impossibility to give even a close estimate of the extent of the savings. Our motor coach operations have undoubtedly recovered passenger traffic previously lost to competitive highway lines or to private automobiles, but here again it is impossible to estimate the extent."

Other Lines

The Norfolk Southern has been operating a motor coach line in Virginia for several years. As to the results obtained, G. R. Loyall, president of the Norfolk Southern says, "We are operating a motor coach line between Norfolk, Va., and Virginia Beach, via Cape Henry, for passengers, co-ordinating it with our electric line railroad service in that territory. The results so far are fairly satisfactory."

E. E. Loomis, president of the Lehigh Valley, states, "We do not operate any motor coaches and the only highway motor trucks which we operate at the present time are in terminal service, wherein we handle l. c. l. freight from and to connections. While there is undoubtedly some economy in this service, it was established mainly with the thought of expediting our operations."

A western railway which is operating several motor coach routes reports that "motor coach operations have recovered passenger traffic previously lost to competitive motor coach lines or to private automobiles only to a moderate extent. As a result of its motor coach service, however, this company has taken off certain passenger train service, "resulting in an annual saving of 137,110 train miles with a saving in train operation costs of $72,420. This railway anticipates using motor vehicles in the future where they will provide a substitute for local steam passenger train service.

An eastern line reports as follows on the results of a motor coach operation: "Our particular situation, where motor coach operation was installed in lieu of passenger train operation, enabled us to take off three short round trip passenger runs, with an aggregate train mileage of 133. This operation has only been in effect from May, 1927 to the present time.

"For the period May, 1927, to and including March, 1928, or for 10 months, our motor coach service has only cost us 55 per cent of what the passenger train operation cost to serve the same purpose. In arriving at this relative cost, depreciation, interest on investment in motor coaches, maintenance and all operating expenses have been included.

"There was no competitive motor coach service in operation; it was simply a proposition of a passenger train making three round trips per day over a 22 mile run, where the passenger earnings were so very meagre that they fell far short of covering the expense of operation. By the introduction of the motor coach service, we were enabled to eliminate the three round trip passenger runs and to substitute another service at less cost, which, while not militating against the public interest, enabled us to bring our expenses within the range of our revenue."

The president of an eastern railway which has established a large number of motor coach and truck, tractor and trailer operations reports as follows:

"Motor coach operations have been confined to branch line service where the steam passenger train service has been either wholly or partially discontinued, and a measure of reduction in operating expenses has been effected. The operation of motor coaches, being in branch line territory, is in sparsely populated sections, and we have no conclusive data as yet to indicate to what extent, if any, these operations have offset any falling off in passenger traffic due to private automobiles and motor coach lines.

"Trucks, tractors and semi-trailers are operated over the highways and in the main are employed to supplant local way peddler l.c.l. freight train service. This eliminates slow moving trains over our main lines and produces some economy. It has also resulted in improving the service in specific instances. Our motor truck operations have been beneficial, although the volume of l.c.l. freight handled by competitive motor truck lines in short haul runs still continued to be quite extensive.

"Our experiences with motor vehicles both in passenger and freight service are still experimental and subject to continued study and development. Our plan, however, is flexible enough to comprehend any developments growing out of our experience."

Difficulties Encountered

Some of the difficulties encountered by railways endeavoring to engage in motor coach operation are described by W. G. Bierd, receiver of the Chicago & Alton, which has a large number of applications for motor coach operating certificates pending. "While we have been attempting to operate motor coaches for nearly two years," says Mr. Bierd, "we regret to say that we have gotten practically nowhere. We have been operating in a small way between Jacksonville, Ill., and St. Louis, Mo. The motor coaches have only been able to take care of their direct operating expense, including depreciation. We have not yet been able to take off any corresponding steam service to accomplish any savings in operations.

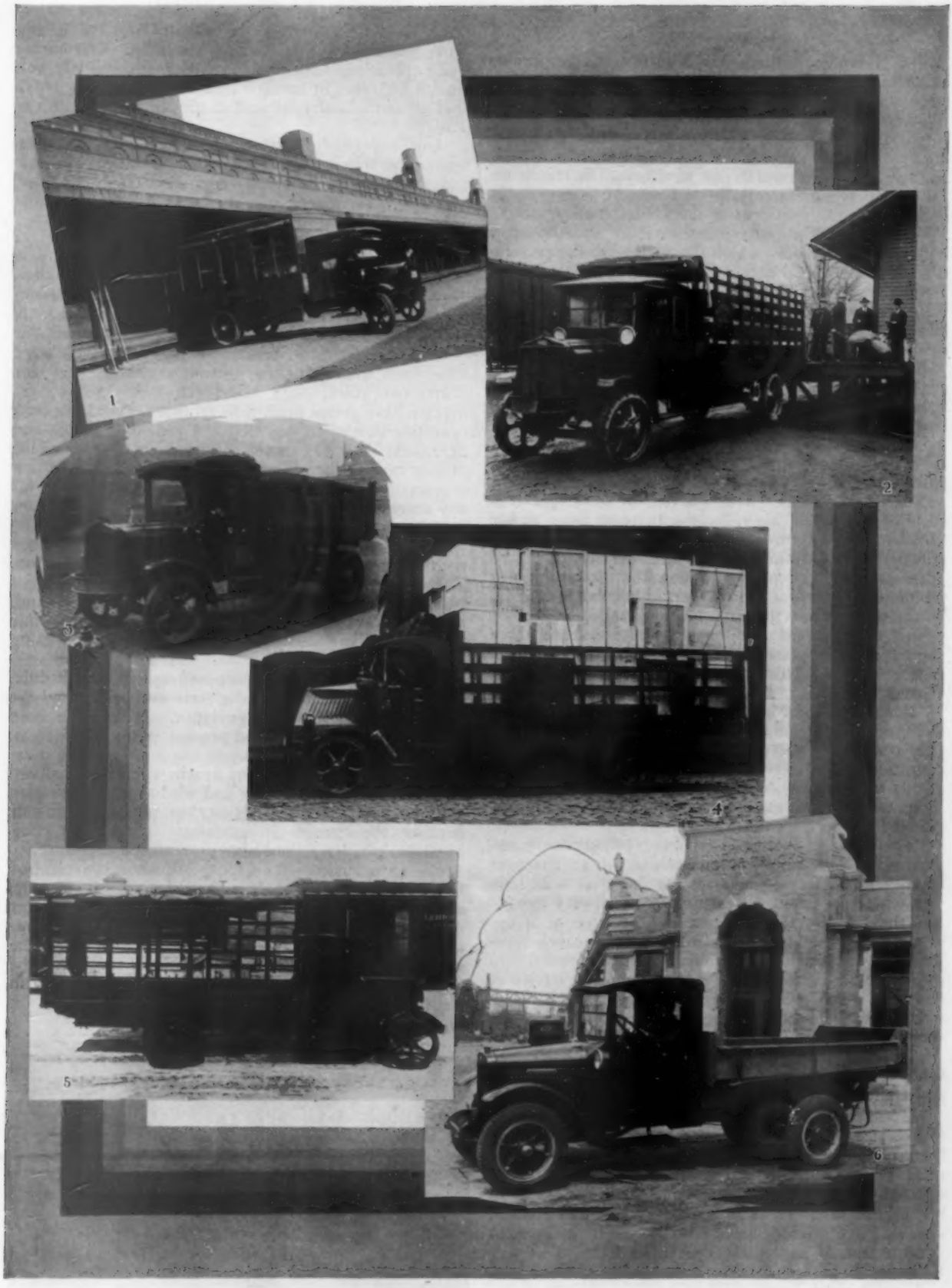
"We are operating two small short line runs, but they are not connected, between Joliet, Ill., and Bloomington. These were formerly operated by two small companies which we bought, first, because they wished to sell and, second, because we thought that we could secure our certificates more easily in that way than by opposing them.

"We have a complete proposed operating schedule. It has been submitted to the state authorities and we have submitted it to the governor. It has also been before both the former and present state commissions, and we have had hearing upon hearing, but have practically gotten nowhere. Our hearings have been closed and made final for months and we have been pressing for and hoping for a decision, but for one reason or another, the changes in examiners, changes in commissions, etc., have until now prevented a decision."

The experience of the Chicago & Alton is typical of that of a number of roads. The Reading, for example, only recently secured its first operating certificates after more than two years before the Pennsylvania commission. The Baltimore & Ohio has had much the same difficulty in West Virginia, and in the West, the Southern Pacific faces a somewhat similar situation in California.

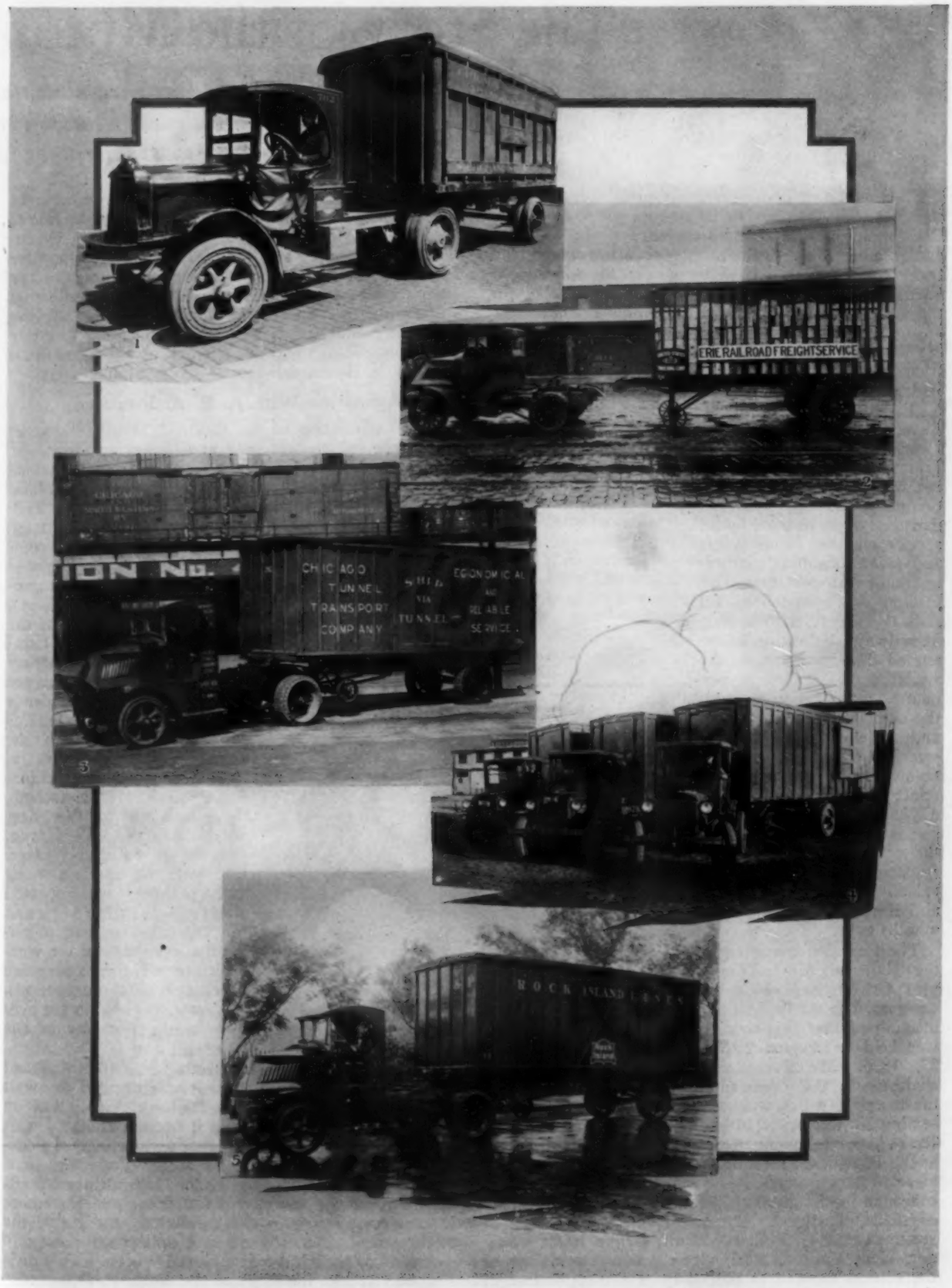
* * *

A South African Railways Motor Coach at Cape Town



Some of the Trucks Which are Working for the Railroads

1. A Federal Truck in B. & O. Service
2. A White in Freight Service on the Pennsylvania
3. Truck in Service on the D. L. & W.
4. A Mack Truck on the Boston & Maine
5. G. M. C. Truck in Railroad Freight Service
6. An International Used by the Lehigh Valley



Tractors and Trailers in Railroad Freight Service

1. White Tractor with Semi-Trailer on the C. N. S. & M.
2. Tractor and Trailer in Erie Freight Service
3. Highway Equipment of the Chicago Tunnel Company
4. G. M. C. Tractors on the Boston & Maine
5. Mack Tractor with Trailer in Service on the Rock Island

The Story of the Motor Tr a

Organization had its inception two years ag
Railroad Motor Transport C
Committees for three se

THE Motor Transport Division of the American Railway Association is holding its second regular meeting at Atlantic City this week. It is the first meeting at which the newly organized committees, under the three sections into which the division is divided, are presenting reports. The sessions of the convention are being held in the Hotel Traymore.

The Motor Transport Division is an outgrowth of the Railroad Motor Transport Conference, which was organized almost exactly two years ago at a meeting held at Atlantic City. This meeting was called by A. P. Russell, vice-president of the New York, New Haven & Hartford and president of the New England Transportation Co., who is now chairman of the Motor Transport Division; H. F. Fritch, president of the Boston & Maine Transportation Company, and F. J. Scarr, at that time supervisor of motor service on the Pennsylvania and now a consulting engineer on motor transportation. This meeting was attended by 121 railway officers, representing 51 railways. Following an extended discussion of the desirability of forming a permanent organization to study the co-ordination of railway and motor transportation, a steering committee was appointed with instructions to select a chairman and to draft a plan for a permanent organization, to be submitted to the next meeting of the conference, which was appointed to be held at Providence, R. I., and Boston, Mass., some two months later.

A. P. Russell

The Providence meeting of the Railroad Motor Transport Conference, which was designated as the first regular meeting of that organization, was held on August 26 and 27, 1926. Mr. Russell, who was chosen temporary chairman by the organization committee, presided at the meeting, which was attended by 50 officers representing 28 railways. In addition to the chairman, Mr. Russell, the following temporary officers were elected at the Providence meeting: T. B. Wilson, then supervisor of transportation of the Southern Pacific, vice-chairman in charge of the section devoted to the study of the application of the motor coach to the use of steam railroads; G. C. Woodruff, freight traffic manager, New York Central, vice-chairman in charge of the section devoted to the study of the application of the motor truck to the use of steam railroads; N. D. Ballantine, at that time assistant to the president of the Seaboard Air Line, vice-chairman in charge of the section devoted to the study of the application of the rail motor car to the use of the steam railways; and F. J. Scarr, secretary and treasurer. An executive committee was also selected, and this committee was instructed to communicate with the officers of the American Railway Association with a view to effecting affiliation with that body. The remainder of the Providence and Boston meeting was devoted to study of the motor coach and motor truck operating methods of the New Haven and the Boston & Maine.

Affiliation With A. R. A. Proposed

The next meeting of the Railroad Motor Transport Conference, which was held at Chicago on December 1 and 2, 1926, heard a report from its executive committee recommending affiliation with the American Railway Association, and acted favorably upon this recommendation. This meeting was attended by 60 officers representing 30 Class I railways, comprising 55 per cent of the railway mileage of the United States. The temporary officers of the conference elected at the Providence meeting were re-elected as permanent officers, with the exception that the secretary, F. J. Scarr, declined nomination, and R. H. Newcomb, then assistant to the vice-president of the New Haven, was elected to fill his place. Following the business meeting, the conference discussed motor coach, motor truck and rail motor car operation, under the leadership of the vice-chairmen of the conference in charge of those sections. A dinner was held in the evening of the first day of the meeting.

Following the Chicago meeting of the Railroad Motor Transport Conference, it was decided to await the action of the American Railway Association on the conference's proposal that it become affiliated with the association before calling another meeting. In consequence, no meetings of the Motor Transport Conference were held during 1927. The member roads of the American Railway Association, on November 17, however, approved the resolution authorizing the establishment of a new division of the association to be known as the Motor Transport Division. This division was to take the place of the motor transport conference.

In its resolution authorizing the organization of the Motor Transport Division, the member roads of the

Transport Division, A. R. A.

years ago at Atlantic City meeting when Transport Conference was formed— three sections now organized

American Railway Association set forth the following rules for the division:

1. Its actions and conclusions should be recommendatory only, in all cases, as is the practice of the other divisions of the association.
2. The number, place and manner of meetings should be subject to the approval of the association.
3. The membership should be confined entirely to representatives of railroads or their subsidiaries.
4. The division should bring about the greatest possible measure of co-operative action with the motor industry itself in any direction that might be advisable.
5. The existing office forces of the association should handle all of the secretarial and other work of the division without any additional expenses of this nature.
6. The outside costs of the association for stationery and printing should not exceed $3,000 per annum.

Division Holds First Meeting

Following the approval of the organization of the Motor Transport Division by the member roads of the American Railway Association and the appointment of Mr. Russell as temporary chairman of the division by R. H. Aishton, president of the association, a meeting was called, to be held at Chicago on January 25 and 26. This meeting was attended by 98 officers of steam railways and 8 officers of electric railways, representing 44 steam roads and 6 electric lines. This meeting was devoted entirely to setting up an organization and to an extended discussion of the subjects to which the division should devote its attention.

The election of officers was the first business of the division. Mr. Russell was elected chairman; T. B. Wilson, vice-president and manager of the Southern Pacific Motor Transport Company, was elected vice-chairman in charge of motor coach section; G. C. Woodruff, assistant freight traffic manager of the New York Central, was elected vice-chairman in charge of the motor truck section; and R. L. Fairbairn, manager of the passenger service bureau of the Canadian National, was elected vice-chairman in charge of the rail motor car section. George M. Campbell, assistant to the general secretary of the American Railway Association, was elected secretary of the division.

G. C. Woodruff

T. B. Wilson

R. L. Fairbairn

G. M. Campbell

The following were elected members of the general committee: J. G. Drew, vice-president, Missouri Pacific; H. F. Fritch, passenger traffic manager, Boston & Maine, and president, Boston & Maine Transportation Company; A. Hatton, general superintendent of transportation, Canadian Pacific; C. S. Lake, special assistant to the president, Chesapeake & Ohio; G. W. Lupton, assistant to the operating vice-president, Atchison, Topeka & Santa Fe; R. K. Stackhouse, general superintendent of stations, transfers and motor service, Pennsylvania; and R. N. Van Doren, vice-president and general counsel, Chicago & North Western. As the law committee of the division, the members of the similar committee of the Railroad Motor Transport Conference, of which Mr. Van Doren was chairman, were appointed. It was also decided to appoint a joint committee of members of the Motor Transport Division and of the Mechanical Division to study the mechanical features of motor transport equipment.

It was decided to hold the meetings of the Motor Transport Division three times annually, in June, October and February, the October meeting to be known as the annual meeting. The officers elected at the Chicago meeting will hold office until the October meeting of the division in 1929. In the future, officers elected will hold their positions for two years.

In connection with the discussion of subjects to be considered by the division, a considerable interest in the development of air transportation was disclosed, and the recommendation was approved that the American Railway Association be asked to assign the study of the subject of the co-ordination of railway and air transportation to some division. A report on this subject was to be presented to the general committee of the division at its meeting on June 20.

The Present Organization

Following the first meeting of the division at Chicago, the vice-chairmen in charge of the three sections of the division proceeded to the organization of their committees. To facilitate the meetings of the various committees of the division, it was proposed that the country

be divided into six regions, each of these regions to have a regional chairman of each section of the division under whom members of the regional committees would serve. The chairmen of these regional committees in turn would comprise the national committees of the three sections, serving under the chairmen of these sections. A map showing the division of the country into the regions proposed is reproduced herewith. On

Tentative Territorial Committee Subdivisions Proposed for the Motor Transport Division

account of lack of time, it was not possible to organize the regional committees prior to the present Atlantic City meeting. The chairmen of the three sections, however, have selected the membership of their national committees.

The following is a tentative list of the committee on motor coaches under the leadership of Mr. Wilson, as chairman of that section:

R. J. Littlefield, manager motor coach service, Boston & Maine Transportation Company, Boston, Mass.

F. S. Hobbs, general manager, New England Transportation Company, Boston, Mass.

G. L. Whipple, general superintendent transportation, Union Pacific System, Omaha, Neb.

M. F. Steinberger, special engineer, Baltimore & Ohio, Baltimore, Md.

E. D. Osterhout, passenger traffic manager, Reading, Philadelphia, Pa.

R. H. Clarkson, Santa Fe Transportation Company, Santa Fe, N. M.

C. B. Foster, passenger traffic manager, Canadian Pacific, Montreal, Que.

The following subjects were assigned to the committee of the motor coach section:

1. What is the determining factor in establishing motor coach service:

(a) Should the subject be approached from the standpoint of operating savings alone, or should it be approached also as a protection to passenger revenue that rightfully belongs to the railroad; (b) suggested methods of making surveys to determine the desirability of motor coach operation.

2. Scope of service in which motor coaches are used by railroads, viz: (a) as replacement for unprofitable trains; (b) as a supplement to existing service; (c) as feeder service; the feasibility of long and night runs.

3. Policy with respect to carrying liability insurance or of providing for self-insurance by building up a reserve fund to take care of claim and liability payments; the advisability of legislation requiring independent lines to carry sufficient insurance to protect the public.

4. The action of the state railroad commissions in allowing railroads to co-ordinate rail and highway service; also public opinion and reaction on co-ordinated service with railroads versus independent motor coach service.

5. Methods of maintenance of equipment; inspection made by state commission representatives.

6. Type of motor coach equipment most suitable for railroad needs, and body construction of coaches to accommodate passengers, baggage, mail and express.

Committee of Motor Truck Section

At the time of going to press, the regional committee

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A South African Railways Combination Coach and Truck at Citrusdale, Cape Colony

chairmen to serve under Chairman Woodruff as the general committee of the motor truck section had not been selected. The following roads, however, had each been requested to appoint an officer to serve on this committee:

Atchison, Topeka & Santa Fe	Missouri Pacific
Atlantic Coast Line	Northern Pacific
Baltimore & Ohio	Pennsylvania

Committee of Rail Motor Car Section

As the rail motor car committee, to serve under Chairman Fairbairn of this section, the following have been appointed:

H. M. Eicholtz, assistant general manager, Chicago & North Western, Chicago.

E. W. Lollis, general superintendent, Chicago, Milwaukee, St. Paul & Pacific, Chicago.

E. Wanamaker, electrical engineer, Chicago, Rock Island & Pacific, Chicago.

G. L. Whipple, general superintendent of transportation, Union Pacific System, Omaha, Neb.

J. K. McNeillie, superintendent, Delaware & Hudson.

L. B. Burns, assistant general manager, Seaboard Air Line.

All of these committees were tentative and subject to revision at the meeting of the general committee on June 20. The territorial lines of the various regions also were subject to change.

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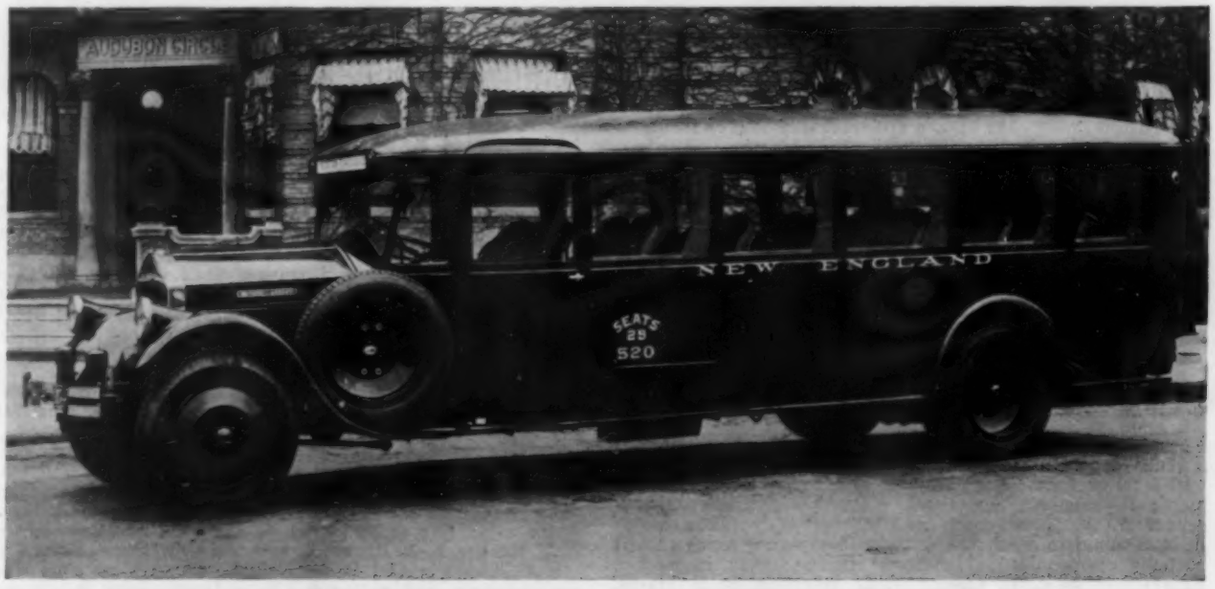


New England Transportation Company Pierce-Arrow Coach in Boston-Providence Service

One of Reading's New Club Coaches

Manufacturers Show Motor Transport

Motor coaches, trucks, automotive accessories and equipment used in maintenance of motor vehicles in Marine Hall and on pier for Motor Transport and other divisions

MANUFACTURERS of motor transport equipment, including motor coaches and trucks, automotive accessories and equipment used in the maintenance of motor vehicles are exhibiting their products in Marine Hall and on the Million Dollar Pier in conjunction with the exhibit of the Railway Supply Manufacturers' Association, for the benefit of railway officers attending the conventions of the Motor Transport Division, the Mechanical Division and the Purchases and Stores Division. The exhibit this year is much more comprehensive than the one at the same convention two years ago, a considerably larger number of manufacturers having their equipment on display. The exhibit opened on Wednesday, June 20, and will continue until the close of the Mechanical Division convention on June 27.

The names of the motor transport equipment manufacturers exhibiting, the equipment on display, the names of their representatives attending the convention, and the numbers of the spaces in Marine Hall and on the Million Dollar Pier occupied by them, are given below.

Companies Exhibiting Motor Coaches and Trucks

American Car & Foundry Motors Company, New York.—Twenty-nine-passenger A.C.F. parlor observation coach with curb level baggage space under the raised observation compartment; 21-passenger, Series 602, A.C.F. parlor coach; 29-passenger A.C.F. parlor coach with all-steel body; 29-passenger de luxe suburban coach; 230-in. wheelbase motor coach chassis partially disassembled; Hall-Scott engine display in motion. Represented by C. C. Castle, W. L. Stancliffe, R. S. Hayes, Frank Jay, W. J. Overman, J. J. McMahon, F. H. Foglesong, W. B. McCormick, F. L. Martin and W. E. Reed. Spaces 858, 859, 860, 861, 862, 863 and 864.

General Motors Truck Company, Pontiac, Mich.—Yellow Type-Z-33 city service motor coach; Type-Y parlor coach; Type-Z-33 motor coach chassis; Type-Y motor coach chassis; Yellow sleeve valve, cut-away engine; G. M. C. motor truck. Represented by H. E. Listman, R. E. Fielder, R. C. Snell, J. L. Byers, J. J. St. Croix, E. Brackett, R. Scott Smith, E. J. Stone and E. D. Rutherford. Spaces 844, 845, 846, 847, 848 and 849.

Lang Body Company, Cleveland, Ohio.—Steel and duralumin motor coach body on A.C.F. de luxe chassis. Represented by E. J. Lang and Wm. C. Naegel. Spaces 859, 860, 861, 862 and 863.

Mack-International Motor Truck Corporation, New York.—Specially designed motor truck for handling l.c.l. container bodies, in connection with a working freight container system; specially designed motor coach for handling both passengers and express matter; six-cylinder motor coach chassis; double unit gas-electric rail motor car. Represented by C. S. McDonald, R. A. Hauer, H. A. Lorick, E. M. Post and M. L. McGrew. Spaces 832, 833, 834, 835, 836 and 837.

Murray Corporation of America, Detroit, Mich.—Thirty-three-passenger Murlyte motor coach body, mounted on 239-in. wheelbase, C. H. Will chassis. Represented by Fred A. Wales, John McArdle and F. A. Selje. Spaces 842 and 843.

Studebaker Corporation of America, South Bend, Ind.—22-passenger Seminole parlor motor coach; 21-passenger street car-type motor coach; new Reading type motor coach; Model 75 heavy duty chassis. Represented by Charles H. Wondries, Paul H. Castner, H. V. Loveland, C. H. Miller, R. H. Wisbach, R. B. Van Dyke, C. E. Yeatman and George Sherman. Spaces 838, 839, 840 and 841.

Twin Coach Corporation, Kent, Ohio.—Twin coach parlor car; special rail-highway Twin coach. Represented by F. R. Fageol, E. S. Rider, Ross Schram and J. Allan Smith. Spaces 772 and 773, and track exhibit on Reading Company tracks.

White Company, Cleveland, Ohio.—White six-cylinder, Model 54 motor coach with 240-in. wheelbase, seating 33 passengers, equipped with new type body constructed with overhead baggage compartments on the inside; White, Model 53, parlor-type motor coach, seating 17 passengers; new White heavy-duty motor truck chassis, Model 58; White heavy-duty tractor for use with trailer; chassis units of White six-cylinder motor coach, Model 54, comprising engine, clutch, transmission and front and rear axles; cut-away model of White heavy-duty double-reduction rear axle. Represented by Saunders Jones, L. G. Avery, W. A. Maynard, G. R. Bryan, H. P. Starbird and V. W. Fries. Spaces 850, 851, 852, 853, 854, 855, 856 and 857.

Companies Exhibiting Automotive Accessories

Baker-Raulang Company, Cleveland, Ohio.—Baker elevating truck, Type-DEXQ; Baker Hylift truck, Type-DHLQ. Represented by B. C. Hooper, M. A. Watterson, N. Platt, H. B. Greig, E. J. Bartlett, H. E. McCoy and S. M. Conant. Space 338.

Robert Bosch Magneto Company, Inc., Long Island City, N. Y.—Bosch Acro system for heavy oil engines; fuel pumps and injectors for Diesel type oil engines; magnetos; spark plugs; horns; electric generators; motor coach electrical equipment. Represented by L. Beeh and A. J. Poole. Space 718.

Bragg-Kliesrath Corporation, Long Island City, N. Y.—B-K Vacuum booster brake and automatic brake wear compensator. Represented by C. S. Bragg, Victor W. Kliesrath and Frank B. Willis. Space 768.

Brown-Lipe Gear Company, Syracuse, N. Y.—Industrial clutches; reversing transmission; seven-speed transmission; five-speed transmission; single-plate clutches and power take-offs for industrial machinery, trucks, motor coaches and rail motor cars. Represented by J. O. Pierce, E. S. Nottingham, R. V. Hessler, E. A. Brown, E. Fish and C. B. Spase. Space 758.

L. C. Chase & Co., Boston, Mass.—Chase Velmo plush in new colorings and patterns; Chase Leatherwove upholstery. Represented by H. T. Wight, George E. Sawyer, D. P. Underhill, E. R. Campbell, C. R. Warren and C. J. Dyer. Space 10.

Clark Tructractor Company, Battle Creek, Mich.—Clark three-ton Truclift; Clarkat three-wheel Tructractor; Clark steel trailers, one and two-ton sizes. Represented by R. J. Burrows and A. S. Rampel. Space 336.

Cleveland Tanning Company, Cleveland, O.—Upholstery leathers of Hyaline, Metakrome, Chroline, Alfatan and Cletan qualities. Represented by F. W. Wilhelmy and Albert Hoinke. Space 34.

Consolidated Car-Heating Company, Inc., Albany, N. Y.—New designs of electric heaters of enclosed element and protected open coil types; thermostatic control equipment; complete pneumatic car door operating equipment with both pneumatic and electro-pneumatic control, including automatic treadle-operated doors; high voltage buzzers and bells; automatic ventilators; safety switches; safety switch panels. Represented by C. S. Hawley, W. S. Hammond, George E. Oakley and L. A. Latch. Spaces 118 and 119.

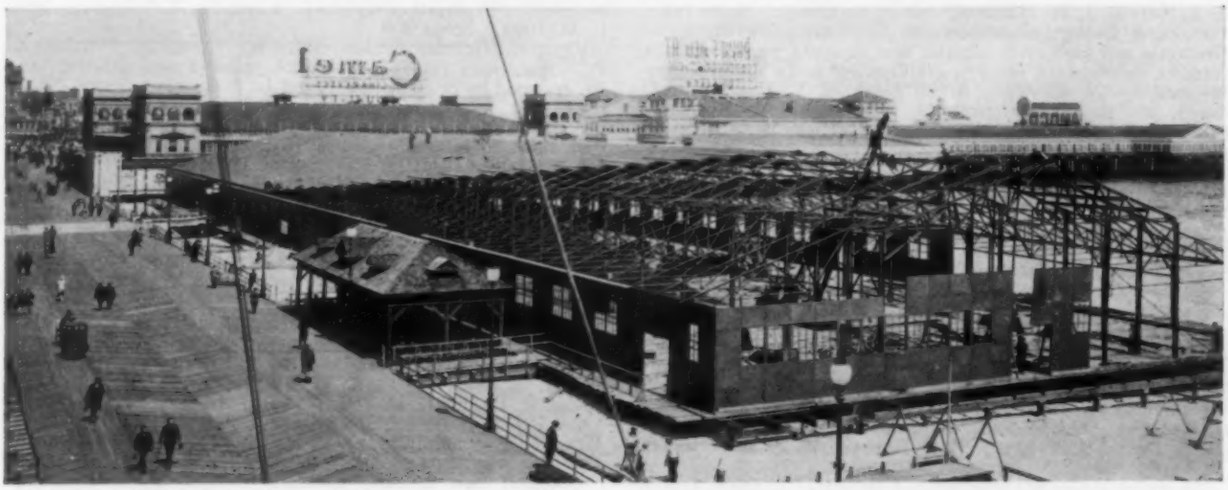
Dixon Crucible Company, Joseph, Jersey City, N. J.—Graphites; graphite products; associated products used on railroads. Represented by J. M. Willits, J. J. Tucker, E. S. Glauch and D. Thurston. Space 612.

Eagle Ottawa Leather Company, Grand Haven, Mich.—Upholstery leather for railroad car and motor coach seats. Represented by George W. Frey, Jr., and Frank Kennedy. Space 363.

O. M. Edwards Company, Inc., Syracuse, N. Y.—Window fixtures; top, bottom and side weather-stripping; metal stop casing and parting stop; metal sash balances; brass sash. Represented by O. M. Edwards, Sr., Harold Edwards, J. J. Edwards, O. M. Edwards, Jr., E. F. Chaffee, F. W. Chaffee, C. H. Cronmiller and C. H. Rockwell. Spaces 525 and 527.

Electric Service Supplies Company, Philadelphia, Pa.—Keystone headlight switches; Keystone lamp guards. Represented by C. J. Mayer, A. H. Englund, J. W. Porter, H. G. Lewis, H. D. Rohman, T. H. Williams, J. F. Carper, J. C. Pope,

Equipment at the 1928 Convention



Getting Ready for the Exhibits at Atlantic City

C. W. Berg and H. J. Graham. Spaces 574 and 575.

Electric Storage Battery Company, Philadelphia, Pa.—Exide batteries; Exide Ironclad batteries for railway, motor coach and industrial truck and tractor service. Represented by H. E. Hunt, H. B. Crantford, E. H. Watkins, H. C. Folk, A. H. Adkins, L. E. Lighton, J. C. Carson, W. Van C. Brandt, E. C. Kline and W. E. Fischelis. Spaces 607 and 609.

Gould Storage Battery Company, Inc., New York.—Storage batteries. Represented by K. M. Smith, C. W. Bell, L. C. Hensel, A. M. Andersen and A. J. Davis. Spaces 308 and 310.

Hale & Kilburn Company, Philadelphia, Pa.—Motor coach seats. Represented by R. D. Day, W. M. Swope, R. F. Stubblebine, H. B. Gengenbach, W. J. Clair, R. O. Young and W. G. Flood. Spaces 408 and 410.

Heywood-Wakefield Company, Wakefield, Mass.—Motor coach seats. Represented by E. C. Lang, G. E. Cornwall, Bertram Berry, C. E. Preble, T. D. Owler, J. V. Conway, W. E. Foreman, A. F. McLachlin and J. H. McBean. Spaces 522, 524 and 526.

Libbey Glass Manufacturing Company, The, Toledo, Ohio.—Libbey reflex glasses; Libbey bull's-eye glasses; Libbey lenses. Represented by J. A. Carson. Space 536.

Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Brake drums of Hunt-Spiller iron for heavy-duty motor coaches and trucks. Represented by J. G. Platt, V. W. Ellet, E. J. Fuller, A. B. Root, Jr., F. W. Lampton, C. L. Galloway, F. B. Hall, R. R. Wells, D. F. Hartman and Gordon L. Leach. Spaces 564 and 565.

Massachusetts Mohair Plush Company, Boston, Mass.—Mohair plush for coach seats. Represented by Henry M. Bliss, A. B. Mason, W. W. Melcher, S. W. Midgley and R. W. Preikschat. Spaces 36 and 40.

National Malleable & Steel Castings Company, Cleveland, Ohio.—Automobile truck wheels. Represented by T. W. Aishton, A. J. Bazeley, C. K. Brooks, A. O. Buckius, J. J. Byers, T. H. Dovle, G. R. Farrell, E. H. Fathauer, Charles Gaspar, H. W. Gilbert, J. F. Hutson, J. H. Jaschka, C. H. Krakau, F. K. LeVake, W. C. Lewis, C. H. McCrea, G. V. Martin, H. L. Mausk, F. E. Moffett, Benjamin Nields, Jr., George Rasmussen, D. Robinson, R. R. Root, E. H. Schmidt, J. A. Shafer, E. V. Sihler, J. A. Slater, S. L. Smith, F. Snyder, Herbert Spence, R. M. Titgemeyer, E. O. Warner, R. Wittmer and L. S. Wright. Spaces 613 and 615.

National Railway Appliance Company, New York.—Garland ventilators; Economy power saving and inspection meters. Represented by B. A. Hegeman, Jr., H. A. Hegeman, J. M. Pratt, F. M. Richards, A. B. Kroeger, R. L. Cluverius, R. H. Stier and M. Garland. Space 622.

Ohmer Fare Register Company, Dayton, Ohio.—New Ohmer ticket office ticket printers; new Ohmer rapid ticket printer; new No. 80 type ticket printing registers; fare registers; fare boxes; distance recording devices including Recordograf, Odometer and Hub-Odometer. Represented by H. B. Ohmer, I. F. Lutz, G. F. Jacobs, R. T. Abrell, B. C. Palmer and L. P. Stickel. Spaces 723 and 724.

Pantasote Company, Inc., New York.—Agasote headlining, wainscoting and roofs; Pantasote curtain and seat material. Represented by William A. Lake, William Anderson, H. H. Horn and H. G. Mastin. Space 400.

Standard Oil Company of Louisiana, New Orleans, La.—Railroad car and engine oil; gas engine oil; motor oil, medium, heavy, heavy X and heavy XX. Represented by H. C. Ferrell and Hugh Bonham. Spaces 300 and 302.

Textileather Corporation, Newark, N. J.—Artificial leathers for upholstering seats and for vestibule and window curtains. Represented by J. D. Lippman, G. H. McGreevy, S. W. Midgley and R. W. Preikschat. Space 34.

Timken-Detroit Axle Company, Detroit, Mich.—Timken worm gear driving units of from ½ ton to 7-½ tons capacity; front and rear motor coach axles; set of worm gearing that has traveled 585,000 miles under a motor coach. Represented by H. W. Alden, P. W. Wood, G. E. Fox, W. Bonn, R. S. Gay, G. E. Watts, W. L. Love, C. S. Dahlquist, C. E. Hoffer and P. W. Sloan. Spaces 725 and 726.

Timken Roller Bearing Company, The, Canton, Ohio.—General bearing display. Represented by H. H. Timken, M. T. Lothrop, H. J. Porter, T. V. Buckwalter, W. C. Sanders, M. S. Downes, W. L. Campbell and J. W. Spray. Spaces 133 and 135.

Tuco Products Corporation, New York.—Tuco Flexolith composition flooring; Tucork insulation for car floors; Tuco Resisto hairfelt insulation; Tuco National standard treated canvas roofing; Tuco car window screens; Tuco trap doors; Tuco sash balances; Tuco deck sash ratchets. Represented by D. W. Pye, H. B. Chamberlain, R. F. O'Leary, T. L. Miller, C. M. Schramm, C. H. Kadie, R. Gaines, H. B. Wilson, F. A. Barbey, W. H. Byrnes and E. J. Corcoran. Space 547.

Union Asbestos & Rubber Company, Chicago.—Packings; car insulation; brake lining; Insutape and Super Insutape; general asbestos materials. Represented by L. L. Cohen, J. H. Kuhns, W. R. Gillies, O. H. Neal and G. J. Martin. Space 324.

Westinghouse Air Brake Company, Wilmerding, Pa.—Automotive brakes for motor coaches, trucks and automobiles. Represented by S. G. Down, G. W. Wildin, C. R. Ellicott, C. J. Olmstead, Robert Burgess, E. W. Davis, H. S. Clark, J. B. Wright, C. D. Foltz, H. B. Gardner, J. F. Craig, C. C. Farmer and J. C. McCune. Spaces 27, 29 and 731.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Motor coach speed indicator; portable instruments; small motors. Represented by A. J. Manson, T. C. Wurts, C. B. Stainback, J. E. Mullen, R. W. Young, A. H. Candee, S. B. Cooper, F. E. Wynn, Thomas Cooper, R. H. Kilner, T. R. Langan and L. C. Paul. Spaces 23, 25, 88, 90, 92, 94, 96 and 98.

Willard Storage Battery Company, Cleveland, Ohio.—Storage batteries for motor coach starting and lighting. Represented by S. C. Aikenhead, M. L. Miller and L. Sears. Spaces 378 and 380.

Companies Exhibiting Equipment Used in Maintenance Work

E. C. Atkins & Co., Indianapolis, Ind.—Silver steel saws; saw tools, saw specialties; machine knives; grinding wheels;

files; saw guards; scraper blades; Cantol belt wax; hand, rip and panel saws; cross cut saws; metal cutting saws; hack saw blades and frames; metal cutting machinery. Represented by E. S. Norvell, J. W. Hartsook and D. M. Condit. Space 716.

Black & Decker Manufacturing Company, Towson, Md.—Universal and high cycle portable electric tools, including drills, reamers, nut runners, sanders, grinders and screw drivers. Represented by W. C. Allen, R. D. Black, J. K. Courim, J. O. Berry, Jr., E. M. Stuart, R. E. Mizener, G. M. Buchanan, G. F. Fischer, J. K. Laughlin, R. R. Herrick, W. J. Fenwick and H. B. Austin. Space 700.

S. F. Bowser & Co., Inc., Fort Wayne, Ind.—Equipment for handling lubricating oils, gasoline, paint oils and paints; fueling units for gas-electric cars and motor coaches; Bowser Xacto pipe line meter for all classes of liquids. Represented by L. E. Porter, W. E. Frasier, Jr., H. B. Smith, P. E. Krider and H. B. Pflasterer. Space 28.

Carbo-Oxygen Company, Pittsburgh, Pa.—Cutting and welding gases; cutting, welding and lead-burning apparatus. Represented by C. C. Trees and F. A. Wirth. Spaces 572 and 573.

Chicago Pneumatic Tool Company, New York.—Complete line of pneumatic and electric tools, air compressors and miscellaneous accessories; Hicycle electric generator and tools. Represented by J. A. Jackson, A. E. Goodhue, E. K. Lynch, J. L. Rowe, D. E. Cooke, W. A. Kerr, S. A. Congdon, Jr., H. R. Deubel, L. F. Duffy, R. C. Bucholz, W. A. Andrews, Jr., P. Tarasi and R. M. Porter. Space 623.

Chisholm-Moore Manufacturing Company, Cleveland, Ohio.—Model-K Cyclone hoist, equipped with anti-friction bearings at every rotating point; different types of chain hoists, including extended hand wheel hoists; electric hoists and I-beam trolleys; cutout working models of the Cyclone high speed chain hoist and electric hoists. Represented by F. F. Seaman, J. R. Mears and A. Kreh. Space 132.

Cleveland Twist Drill Company, Cleveland, Ohio.—Cle-Forge high speed drills; Peerless reamers; and other tools. Represented by O. B. Hansen, H. G. Smith, I. P. Farnum, R. G. Berrington, F. M. Hoelze, J. G. Ladrick, H. A. Bokram and H. P. Jenson. Space 806.

Cowdrey Brake Tester Organization, Inc., Fitchburg, Mass.—No. 11-A-Cowdrey brake tester installed on Yellow coach. Represented by C. F. Cowdrey, Jr., and representatives of the National Railway Appliance Company.

DeVilbiss Company, Toledo, Ohio.—Complete spray painting and finishing equipment. Represented by E. G. Whitmore. Spaces 828 and 829.

Henry Disston & Sons, Inc., Philadelphia, Pa.—Metal cut-off saws; slitting saws; inserted tooth metal cutting saws; high speed machine hack saw blades; files; metal cut-off machine; metal band saw machine; hack saw machine. Represented by S. H. Disston, C. Forrest, J. Dorrington, Edward Leedy and George E. Hopf. Space 141.

J. B. Ford Company, Wyandotte, Mich.—Wyandotte cleaning specialties. Represented by B. N. Goodell, G. J. Lawrence and W. P. Scott. Space 517.

Hisey-Wolf Machine Company, Cincinnati, Ohio.—Electric drills and screw drivers; electric bench and pedestal grinders; electric buffers and polishers; portable electric grinders and buffers; tool post and angle plate grinders. Represented by E. Ritz, Jr., George Moerlein, J. W. Friedlander, H. W. Wallace, P. A. Rebak, R. C. Howell and S. H. Ford. Space 713.

Hutto Engineering Company, Inc., Detroit, Mich.—Model MJ horizontal grinding machine; model MD vertical grinding machine; model MG grinding machine with double head; Hutto improved portable grinder stand with air cylinder attachment. Represented by G. C. Paye, G. M. Alderman and B. O. Isom. Space 805.

Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.—Hand and motor power tool grinders and attachments. Represented by S. S. Newman and L. J. Cooney. Space 708.

Chas. R. Long, Jr., Company, Louisville, Ky.—Panels displaying finishes for passenger and freight equipment; lacquers; varnishes; enamels and paints. Represented by Chas. R. Long, Jr., N. H. Oakes, J. M. Monroe, W. H. Heckman, J. S. Lemley, Samuel S. Demarest and A. G. Hollingshead. Space 579.

Alexander Milburn Company, Baltimore, Md.—Oxy-acetylene welding and cutting torches; regulators; oxy-illuminating gas torches; acetylene generators; oil burners and preheaters; portable carbide lights; paint spray equipment. Represented by A. F. Jenkins and C. R. Pollard. Space 217.

National Lead Company, New York.—Dutch Boy red-lead for painting all types of metal surfaces; Dutch Boy white-lead for painting all surfaces other than metal; Dutch Boy solders and babbitts. Represented by F. M. Hartley, Jr., F. E. Dodge, Dr. A. H. Sabin and A. B. Tibbets. Space 79.

Oakite Products, Inc., New York.—Oakite cleaning materials; demonstrations of paint removal. Represented by H. L. Gray, L. B. Johnson, E. Geh, J. A. Carter, A. A. Kopp and Guy Gregory. Space 830.

Simonds Saw & Steel Company, Fitchburg, Mass.—Metal cutting saws; files; hack saw blades; grinding wheels. Represented by R. D. Baldwin and H. B. McDonald. Space 810.

L. S. Starrett Company, Athol, Mass.—Latest type micrometers, gages, calipers and dividers; protractors; steel rules; squares; test indicators; hack saw blades; hack saw frames; steel tapes; vises. Represented by D. Findlay, A. H. Starrett, D. Moffat, W. J. Greene and H. E. Masters. Space 85.

Western Tool & Manufacturing Company, Springfield, Ohio.—Expanding mandrels; toolholders; emery wheel dressers; shop furniture. Represented by Henry Morris and David Morris. Space 628.

Weston Electrical Instrument Corporation, Newark, N. J.—Electrical measuring instruments of all types applicable to routine test work; first showing of a complete railroad speed indicator which is a redesign of the Weston model 44 electric speed indicator; selective AC ammeter. Represented by N. M. Trapnell and C. B. Denton. Space 315.

Wilson-Imperial Company, Newark, N. J.—Car cleaning and renovating compounds. Represented by Frank Sherritt, D. J. Giles and C. A. Beaumont. Space 200.

Yale & Towne Manufacturing Company, Stamford, Conn.—Chain blocks, electric chain hoists; overhead cranes; electric industrial trucks, tractors and trailers. Represented by H. J. Fuller, H. Grimshaw, C. Schroeder, R. B. Kite and C. O. Hedner. Spaces 104 and 106.

Other manufacturers of motor transport equipment which will have a reception booth but no exhibit are:

Goodrich Rubber Company, The B. F., Akron, O.—Represented by E. A. Bedell, B. F. Moffatt, A. R. Miller, Frank Flavell, F. W. Wocher and A. B. Peacock. Spaces 18, 20 and 22.

Pratt & Whitney Company, New York.—Represented by W. P. Kirk, D. S. Woods, W. R. Mullinix, L. S. Horner, Harold F. Welch and L. S. Horton. Space 822.

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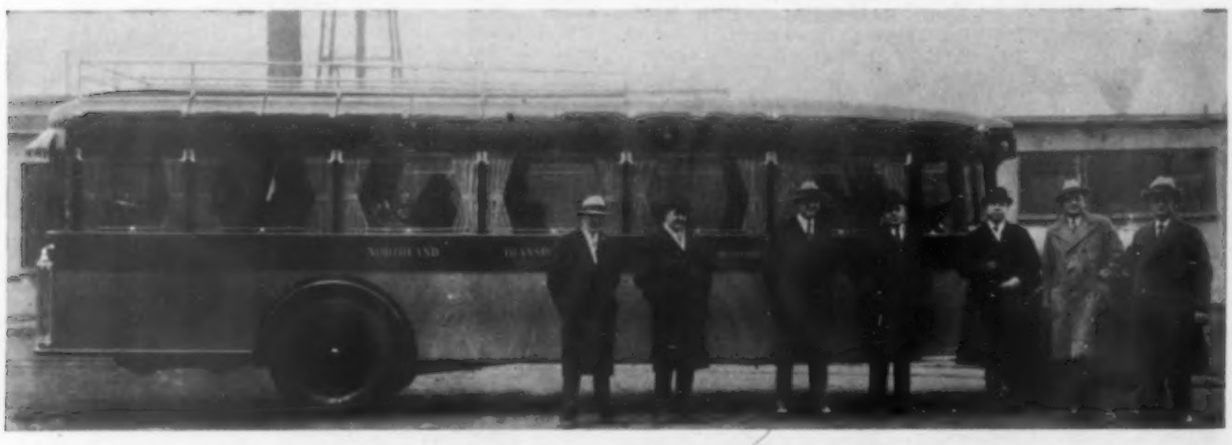

First Motor Coach with All-Aluminum Body Manufactured by the Murray Corporation, Detroit, Placed in Service by the Northland Transportation Company

Motor Transport News

THE CENTRAL OF NEW JERSEY has inaugurated a motor truck service for the transportation of l.c.l. freight between Red Bank and Point Pleasant, N. J. The service is being operated through a subsidiary of the railroad: The Central of New Jersey Transportation Company and one truck has been put in operation.

THE ALTON TRANSPORTATION COMPANY, subsidiary of the Chicago & Alton, on May 27 began the operation of a motor coach line between Jacksonville, Ill., and Carrollton, a distance of 35 miles. Two round trips per day will be operated over this line. The line will supplement rail service on the Chicago-St. Louis line of the Alton which runs via Jacksonville.

A NEW COMPANY, the American Motor Transportation Company, has been organized by W. E. Travis, as president, around the company of which he has been president in the past, the California Transit Company. The purpose of the new company is to consolidate motor coach lines running across the continent under the direction of one organization. An offering has been made of 20,000 shares of cumulative convertible preferred stock.

THE APPLICATION of the Utah Parks Company, subsidiary of the Los Angeles & Salt Lake, for permission to operate motor coaches and trucks in passenger, express and freight service between Cedar City, Utah, and St. George has been denied by the Utah Public Utilities Commission. The commission held, however, that the Utah Parks Company should be permitted to afford to its tourist patrons, traveling by way of the Union Pacific System, motor coach service between Cedar City and St. George whenever and to the extent such service may be required.

IN ADDITION to its motor coach and truck operations shown in the tabulation in this issue, the Atlantic Coast Line has two motor truck routes in line service. One of these extends from Tampa, Fla., to Port Tampa, a distance of 11 miles, and the other from Tampa to Thonotosassa, a distance of 13 miles. One motor truck is used on these routes, this truck being owned and operated by the Atlantic Coast Line. It also uses a motor coach for the transportation of employees between Jacksonville, Fla., and the Jacksonville shops, a distance of four miles. The motor coach used on this run, which is operated by a contractor, makes 22 round trips on week days and 23 round trips on Sunday.

R. F. & P. Plans Coach Line

The Richmond, Fredericksburg & Potomac has applied to the State Corporation Commission of Virginia requesting a charter for a subsidiary company through which it plans to operate a motor coach line between Richmond and Ashland, Va., a distance of approximately 18 miles.

Wisconsin to Issue Order to Fix Motor Coach and Truck Rates

An order fixing rates for transportation of passengers, express and freight by motor coach and truck lines in the state will soon be issued by the Wisconsin Railroad Commission, according to an announcement by L. E. Gettle, chairman of the commission. When the last legislature enacted a law bringing motor transportation companies under the regulation of the railroad commission, no attempt was made to fix rates, each company being permitted merely to file the schedules it had set up. These schedules disclosed a wide variation of charges which have been continued up to the present time.

The commission is said to have found that a number of the companies after fixing a certain rate per mile had added miles to their routes to bring in larger revenue, and a part of the new regulatory plan is to establish definitely the lengths of the various motor coach and truck routes in the state.

The average charge for motor coach transportation of passengers in Wisconsin is considerably less than the average railroad charge, while freight rates on the motor trucks are approximately the same or somewhat less than railroad rates, for similar hauls.

Southern Pacific Gives More Frequent Service

The Southern Pacific Motor Transport Company has inaugurated hourly service between Portland, Ore., and Forest Grove. The new schedule became effective on June 1, and was approved by the Oregon Public Service Commission. Formerly, the company operated six round trips a day on this line. The hourly service is in effect throughout the business day, with somewhat less frequent schedules during the remainder of the 24 hours.

Additional motor coach runs have likewise been instituted between Portland, Cook and Oswego, to provide hourly service on this line also.

Northland Increases Service To Summer White House

Virtually hourly motor coach service has been established between Minneapolis and St. Paul and the summer White House of President Coolidge at Brule, Wis., according to a press report of an announcement by the Northland Transportation Company. A similar increase in schedules is planned between Duluth, Superior and Brule.

Brule is on the motor coach line of the Northland between Duluth and Ironwood, Wis., and is approximately 30 miles from Duluth. The Northland anticipates a heavy passenger business to and from Brule this summer on account of the presence of the President there.

Statistics of Motor Coach Industry

Statistics of the motor coach industry as of January 1, 1928, which are published by the American Automobile Association, are as follows:

Number of common carrier motor coaches ..	44,486
Number of school coaches	35,876
Number of passengers carried by motor coaches in 1927	2,525,000,000
Number of passengers carried by common carrier motor coaches	2,210,000,000
Total investment in rolling stock, terminals, garages, etc., approximately	$500,000,000
Total gross revenue of common carrier motor coach lines in 1927, approximately ..	$313,000,000
Taxes paid by motor coach operators in 1927	$16,000,000
Number of miles of motor coach routes	635,609

P. R. R. Renews Application for Highway Charter

The Pennsylvania, which in February, 1926, filed an application for a charter to permit the formation of a highway subsidiary, which application was refused by Gifford Pinchot, then governor of Pennsylvania, has announced its intention of renewing this application.

At the time of filing the first application for charter, F. J. Scarr, who was then supervisor of motor service for the road, applied to the Public Service Commission of Pennsylvania for several certificates authorizing the operation of motor coach and truck lines, the plan being for him to transfer these certificates to the highway subsidiary, the Pennsylvania General Transit Company, when organized. Several of these certificates were granted to Mr. Scarr, and operations were begun. When the road failed to secure the charter for its subsidiary, however, these certificates were turned over to a contract operator.

At the same time that the then Governor Pinchot refused the charter to the Pennsylvania General Transit Company, he likewise refused a similar application made by the Reading to incorporate the Reading Transportation Company. Following Governor Pinchot's defeat at the last Pennsylvania gubernatorial election, the Reading renewed its application for a charter for a highway subsidiary. Opponents succeeded by court action in delaying the decision but, finally, they failed and the present Governor Fisher authorized the formation of the Reading Transportation Company several months ago. The Reading now has a number of motor coach lines in operation.

The original application by the Pennsylvania sought authority

to operate on the highways in 55 counties of that state and, presumably, the new application will ask for approximately the same charter powers.

Bus Division, the A. A. A. to Meet

The Motor Bus Division of the American Automobile Association will hold its second annual meeting June 27-29 at the Hotel Gibson, Cincinnati, Ohio. Among the addresses to be delivered during the three days are the following: "How Motor Bus and Railroad Service Should Be Co-ordinated," by Howard P. Fritch, president of the Boston & Maine Transportation Company; "Bus Transportation and Its Public Relations," by John A. Ritchie, chairman of Yellow Truck & Coach Mfg. Co.; "Bus Terminals; How They Should be Established and Operated;" "Equipment Maintenance and Its Importance in Bus Operation," by E. A. Hutt, analytical engineer of Vacuum Oil Company; "System in Motor Bus Operation," by Guy A. Huguelet, president, Consolidated Coach Corporation; "Commission Control Over the Certificate of Convenience and Necessity," by E. Blythe Stason, professor of law, University of Michigan, and "Merchandising the Bus Business," by Edward A. Keenan, advertising manager, Philadelphia Rapid Transit Company.

Chicago & North Western's Coach and Truck Operations

In addition to the roads listed in the motor coach and truck operating tabulation in this issue, the Chicago & Northwestern has four motor coach lines operated by contractors. These lines extend from Deadwood, S. D. to Lead, a distance of five miles; Galesville, Wisc., to Trempealeau, a distance of seven miles; Eyota, Minn., to Chatfield, a distance of twelve miles, and Redgranite, Wisc., to Neshkoro, a distance of ten miles. The Northwestern also has two truck lines operated by contractors, one extending from Deadwood to Lead and the other from Rochester, Minn., to Zumbrota, a distance of twenty-six miles.

Among the Manufacturers

The **Haskelite Manufacturing Company**, Chicago, has moved its general offices to the new State Bank Building in that city. The new address of the company is 120 South La Salle street, Chicago.

The **Borg-Warner Corporation**, Chicago, has been organized as a holding company, controlling a consolidation of automotive parts and accessory manufacturers, including the **Borg & Beck Company**, manufacturing clutches; the **Marvel Carburetor Company**, manufacturing carburetors; the **Mechanics Machine Company**, manufacturing universal joints; and the **Warner Gear Company**, manufacturing gears.

Orders for Equipment

THE NARRAGANSETT PIER RAILROAD has ordered a Type-Y Yellow parlor coach from the General Motors Truck Company, Pontiac, Mich.

THE PACIFIC ELECTRIC has purchased two double deck Yellow coaches from the General Motors Truck Company, Pontiac, Mich.

THE READING TRANSPORTATION COMPANY has purchased 4 Model 75 Studebaker motor coach chassis on which are mounted "Club Coach" bodies built to the transportation company's specifications. In the May issue of the *Motor Transport Section* it was incorrectly reported that these were White coaches.

Trade Publications

MOTOR OILS.—"Best Motor Oils Are Vital," is a 36-page booklet, written by Chas. E. Carpenter for E. F. Houghton & Company, Philadelphia, Pa., discussing bootleg oil, viscosity, flash and ignition tests, and arguments advanced by sellers of motor oils.

COACH SEATS.—The 24-page brochure of the Heywood-Wakefield Company, Wakefield, Mass., illustrates a few of the regular and special types of Heywood-Wakefield coach seats which are in daily use throughout the country. Many of the parts of these seats are interchangeable, and almost any desired feature can be incorporated in a coach seat selected.

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Fleet of 321 White Motor Coaches and Trucks in Service of Yellowstone Park Transportation Company

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